MACHINERY ISSUE

THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW

Vol. LXI Cleveland, December 6, 1917 No. 23

Clearing Industry of Obstacles

Government Further Extends Vigorous Measures to Better Operating and Traffic Conditions—Coke Situation Improving—Blast Furnaces and Lake Fleet Make Creditable Tonnage Records in Month of November

TIMELY and vigorous efforts are being made by the government to restore capacity production in iron and steel and some salutary effects already are appearing. The tension from coke shortages has been eased somewhat, although about 20 Steel corporation blast furnaces still are banked. The Steel corporation now is operating at not more than 85 per cent of ingot capacity. Traffic conditions under the pooling system gradually are emerging from the hopeless confusion of a few weeks ago. Further measures are being taken to fortify the industry against a repetition of its serious predicament of recent weeks. Committees of railroad officials and of operators have been formed to arrange exchanges of coke in the Connellsville region in order to prevent cross shipments, which have been obstructive to traffic efficiency. The latest action of eastern railroads in refusing to accept overseas shipments in plates, billets, bars, pig iron and scrap unless consigned to the United States government effects a further control of both export tonnage and traffic in the most congested territory. The sweeping character of this step is illustrated by the fact that, it is estimated, there are at present 1,325,000 tons of iron and steel to be shipped overseas.

Profiteering is Absent

President Wilson's strictures on profiteering and the necessity for further price regulation find little application to the iron and steel industry where readjustment to a greatly reduced price level practically has been completed. Variations from the agreed schedules are inconsequential at present. War requirements are being accommodated with the utmost dispatch and heavy tonnages are being taken on weekly. It is officially estimated that the Steel corporation now is devoting 80 per cent of its capacity to government needs and has made large appropriations especially to serve war business. Platemakers are discounting an expectation that practically the entire 1918 output of both sheared and universals will be required by the government. In 1916 the plate output was 3,677,384 tons, and it has undergone constant increase since. A new and novel call for steel now before steelmakers covers a tonnage for 1000 tanks for the American expeditionary forces. For a new award of vessels to the International Shipbuilding Corp., 182,000 tons of fabricated material is wanted and for 100 further boats for the Submarine Boat Corp., the requirements are estimated at upward of 250,000 tons.

Iron Supply Far Short

Manifestations of a severe shortage of pig iron under present conditions of production and consumption grow weekly. The market is overrun with unsatisfied inquiries for steelmaking iron. Buying propositions in basic before sellers during the week have increased to not less than 200,000 tons. Very few sales are being made. Sellers are at sea as to what they may take on safely for future delivery because of undependable coke supply. Some large steelmakers in the Pittsburgh district have been able to obtain basic tonnage through middlemen in exchange for sheet bars. The effect of a shifting of a number of merchant furnaces from foundry to basic is shown by the increased difficulties of the casting industry in obtaining metal supplies. Virtually no northern foundry is in the market and southern offerings are limited. The scarcity of malleable is equally pronounced.

Considering operating conditions, November made a very good showing in pig iron production. The total was 3,195,466 tons, or only 100,460 tons less than October and the daily average actually was increased by 195 tons. Banking of a good many furnaces occurred toward the close of the month. A very gratifying achievement is credited to the lake fleet in moving 7,333,828 tons of ore in November, the largest total for that month on record, and 1,618,376 tons over November, 1916. Total ore shipments to Dec. 1 were 61,587,426 tons.

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EDITORIAL

The Problem of Pig Iron Supply

INADEQUACY of the country's present production of basic pig iron to meet all the requirements of the open-hearth steel works has been brought out in a pronounced fashion by the market developments of the past two or three weeks. A total of at least 200,000 tons of unfilled requirement is represented by the inquiry now seeking a position on makers' books this side of July 1 and much of it before April 1. Under the present alignment of production it is difficult to see how this tonnage can be squeezed out of the furnaces since they are heavily sold-up for months ahead and dare not increase their obligations in view of the unstable working conditions brought about by the irregularities of coke supply.

What is true of basic, is equally true of other grades, notably foundry and malleable. This has not been so conspicuous, however, since the consumers of the latter grades are much smaller individually and more numerous than the steel works. Hence their wants are more diffused. When the average foundryman suffers from a lack of pig iron it is likely to attract less attention especially at present when war conditions have made capacity output in steel so essential. Relatively, however, the casting industry now is suffering as acutely as the steel manufacturers from a shortage of raw materials. In fact, the statement is made that its deficiencies now are even worse than the open-hearth plants especially since numerous merchant blast furnaces have turned from the making of foundry and malleable iron to basic. This shift has been encouraged by the difficulty of getting standard coke and by the fixing of the same price of $33, furnace, on northern No. 2 foundry iron and basic. The cheaper production cost of the latter has induced many makers to change their mixtures accordingly.

Leaving aside all questions of immediate advantage, however, it is manifest that the country has not been producing iron at the same rate it has been consuming it. The depleted stocks of large steel companies which usually produce all the iron they need, illustrate this. These consumers have been buying all the iron they could gather in. New blast furnace construction has not kept pace with steel works extensions in recent years and is not likely to for some time. It is, of course, a much simpler undertaking to build an open-hearth works, particularly an extension of an existing plant, than it is to erect and equip a blast furnace under prevailing conditions.

The present shortage of basic applies more to future than to immediate needs. Steel production consequently is not likely to be influenced so adversely at this time as may be the case a few months hence. Time alone will determine whether it will be necessary for the government to regulate blast furnace production by establishing a priority of grades as well as of consumers of pig iron in order that the output of war supplies may not suffer.

A New Transportation System

MANUFACTURERS who now are spending more time in consultation with their traffic managers than with their sales managers—and that includes about every plant executive—will take more than a passing interest in the announcement made a few days ago that the New York state barge canal is 95 per cent completed. The railroads, while operating at a higher efficiency than even they themselves had thought possible, are proving daily that their maximum freight-moving ability falls short of the less-than-maximum freight-producing capacity of the country. Any addition to the country's transportation facilities necessarily relieves some of this burden.

When the new barge canal is thrown open for traffic along its entire length early in 1918, a 790-mile waterway system will be added to the country's transportation resources. The canal passes through some of the richest and most densely populated sections of the country, rich both in its manufacturing and agricultural resources, and makes Buffalo a next-door neighbor of New York, the Great Lakes being an arm of the Atlantic.

In cost, amount of excavation and yardage of concrete placed, the canal measures about one-half of the Panama canal. The new canal is much more than a deepened and widened revival of the old Erie canal. In many sections, new channels were dug and a waterway of uniform depth and width has been created.

The American Bridge Co. is constructing a fleet of 600-ton barges for one company. Plans are under consideration for handling ore and grain to seaboard, and for bringing to the west a variety of products, including those from the Pacific coast which can be handled well beyond Chicago before encountering equal rate competition from the all-rail routes from the west.

The country's present intensive study of its inland waterways is a result of war conditions, but will have an important influence long after peace is con-

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EDITORIAL

cluded. If the optimistic predictions that the barge canal will soon rank as an important transportation artery prove well founded, a great impetus will be given to plans for similar developments in other parts of the country.

Business Strategy Develops

BEHIND the trenches and battle lines, industry is firmly entrenching itself for the keen commercial competition that is to follow in the wake of the war. The industrial aggrandizement inaugurated by many companies to insure their establishment as a rugged business institution in order that they may enter the lists after the war, however, is producing many complicated problems. The factors of raw materials, new equipment, fuel and labor are compelling manufacturers in many instances to resort to strategy.

An instance of this is found in the case of an operator of a metal rolling mill whose plant was burdened with orders. This manufacturer, recalling the somewhat precarious condition of his business previous to the war, decided to take advantage of the opportunity to establish it on a firmer foundation by enlarging its facilities for production. After a survey of the plant was made it was found that an additional roll-stand easily could be installed without any building addition. Upon inquiry, it was learned that delivery of this equipment could not be obtained in anything short of six months. Then a scheme was evolved. An inventory was taken of the repair parts the company had in stock. Included was a housing of the type it was desired to add. A carefully worded telegram then was dispatched to the foundry for a housing and similarly worded messages were sent to the manufacturers for screw boxes, carriers and other parts. The telegrams brought to the company's door most of the smaller parts ordered within two weeks, and before a month had passed the much-coveted roll housing was delivered. Meanwhile the foundation work had been completed. The installation of the mill immediately was commenced, with the result that in less than two months from the time that the plan was decided upon, the mill was in operation.

Ingenious though the plan was, it scarcely commends itself for general adoption and there is little probability of its being applicable in many instances. However, it is indicative of some of the plans that manufacturers have been forced to resort to in order to cope with the restraints of a speeded-up industrial situation.

Reclaiming Unfit Workmen

BEFORE the present session of congress is a bill, introduced by Senator Pomerene of Ohio, providing for an appropriation of $100,000,000, to be used in the establishment of reclamation camps, wherein the majority of men between 21 and 31 who have been rejected as physically unfit for the army or navy, may be reclaimed for military service. Dr. John H. Quayle of Cleveland, father of the reclamation idea, declares that the majority of rejected men can be reclaimed, and goes further to say that the same plan can be practically applied in industry. An article in the present issue of THE IRON TRADE REVIEW discusses the industrial possibilities of the reclamation plan with the viewpoint of the author.

Dr. Quayle's idea has been widely discussed in magazines and newspapers and everywhere has been commented on favorably. The proponent of the bill in the senate, Mr. Pomerene, has been the author of numerous administration measures and propositions favored by the administration, so that the proposed act is likely to be pushed. No opposition has appeared against the bill. Because Dr. Quayle has resided in Germany, is a practical and successful medical man, and says that it is his opinion that all of our best man power will be needed to defeat the Germany he knows by intimate contact, his proposition is being given respectful consideration.

Industry will be interested in Dr. Quayle's postulate that workmen can be reclaimed physically, and through physical reclamation, mentally, so that production of war, materials, and later the production of materials of peace, will be improved in quantity and quality. According to the doctor's estimate, the reclamation plan would cost about $100 a man. "Is it worth $100 a man to reclaim men for American industry?" he asks.

A partial answer, as the article in this issue points out, is found in the systems already initiated by iron and steel corporations, and other industrial concerns, designed to improve the functional morale of the American workman both for his own benefit and for that industry. So-called welfare work, it has been proved, produces increased dividends both in wage increases and in greater profits. The head of one of the largest steel companies which has carried welfare work to a very advanced stage, has estimated that this system is worth a cold million dollars annually to the corporation in increased earnings.

These are speeding-up times, and necessarily so. Dr. Quayle offers a suggestion seemingly worthy of special consideration.

Iron and Steel Prices

Corrected to Wednesday Noon

SCRAP, WAREHOUSE AND IRON ORE PRICES ON PAGE 1246

PIG IRON

Bessemer valley	$36.30
Bessemer, Pittsburgh	37.25
Basic, Pittsburgh	33.95
Basic, eastern Pa.	33.00
Basic, Buffalo	33.00
Malleable, Pittsburgh	34.45
Malleable, Chicago	33.50
Malleable, Philadelphia	37.00 to 37.50
Malleable, Buffalo	33.50

GOVERNMENT SCHEDULE

1.75 to 2.25 silicon (No. 2 foundry, No. 2 plain, and No. 3 southern)	$33 furnace base
2.25 to 2.75 silicon (No. 2X, No. 1 Northern foundry, and No. 2 southern)	base plus 50c
2.75 to 3.25 silicon (No. 1X, No. 2 soft)	base plus $1.50
Over 3.25 silicon	$34.50, plus $1.00 for each ½ per cent of silicon.

No. 1X, Phila.	35.00 to 35.25
No. 2 foundry, Pittsburgh	33.95
No. 2 foundry, Cleveland	33.95
No. 2 foundry, Ironton	33.00
No. 1 foundry, Chicago	33.50
No. 2 foundry, Chicago	33.00
No. 2X foundry, Phila.	34.00 to 34.25
No. 2X foundry, N. J. tide	34.25 to 34.50
No. 2X foundry, Buffalo	33.50
No. 2 plain, Philadelphia	33.50 to 33.75
No. 2 plain, N. J. tide	33.75 to 34.00
No. 2 southern, Birmingham	33.00 to 33.50
No. 2 southern, Cincinnati	36.40
No. 2 southern, Chicago	37.50
No. 2 southern, Phila. del.	38.30 to 39.40
No. 2 southern, Cleveland	37.50
No. 2 southern, Boston	39.50
No. 2 southern, St. Louis	35.90
Virginia, No. 2X, furnace	33.50
Virginia, No. 2X, Phila.	36.77
Virginia, No. 2X, Jersey City	37.02
Virginia, No. 2X, Boston	37.27
Silveries, 8 per cent, furnace	46.00
Silveries, 8 per cent, Chicago	48.54
Low phos. standard, Phila.	55.00 to 56.00
Low phos. Lebanon furnace	50.00
Low phos., Pittsburgh	53.00
Charcoal, Superior, Chicago	37.50
Charcoal, Superior, Buffalo	39.75
Charcoal, southern, furnace	43.00

COKE

(At the ovens.)

Connellsville furnace	$6.00
Connellsville foundry	7.00
Wise county furnace	6.00
Wise county foundry	7.00
Pocahontas furnace	6.00
New River foundry	7.00
New River furnace	6.00

FERRO ALLOYS

Ferromanganese delivered	$235.00 to 250.00
Spiegel, 20 per cent fur.	59.00 to 60.00
Ferrocarbon titanium, carloads, maker's plant	160.00
Ferrosilicon, 50 per cent, Pittsburgh	170.00
Ferrosilicon, 50 per cent, Pitts., 1st quarter	150.00 to 160.00
Bessemer ferrosilicon, 9 per cent.	$51.70
Bessemer ferrosilicon, 10 per cent.	55.00
Bessemer ferrosilicon, 11 per cent.	58.30
Bessemer ferrosilicon, 12 per cent.	61.60

Ferrosilicon prices at Ashland, Ky., Jackson and New Straitsville, O.

SEMIFINISHED MATERIAL

BILLETS

Open hearth, Pittsburgh	$47.50
Open hearth, Philadelphia	50.50
Open hearth, Youngstown	47.50
Bessemer, Pittsburgh	47.50
Bessemer, Youngstown	47.50
Forging, Pittsburgh	60.00
Forging, Philadelphia	63.00

SHEET BARS

Open hearth, Pittsburgh	$51.00
Open hearth, Youngstown	51.00
Bessemer, Pittsburgh	51.00
Bessemer, Youngstown	51.00

WIRE RODS AND SKELP

Wire rods, Pittsburgh	$57.00
Grooved skelp, Pitts.	2.90c
Sheared skelp, Pitts.	3.25c

SHAPES, PLATES AND BARS

(In cents per pound)

Structural shapes, Pitts.	3.00c
Structural shapes, Phila.	3.185c
Structural shapes, N. Y.	3.195c
Structural shapes, Chicago	3.00c
Tank plates, Chicago	3.25c
Tank plates, Pittsburgh	3.25c
Tank plates, Philadelphia	3.435c
Tank plates, New York	3.445c
Bars, soft steel, Pittsburgh	2.90c
Bars, soft steel, Chicago	2.90c
Bars, soft steel, New York	3.095c
Bars, soft steel, Phila.	3.085c
Bar iron, Chicago	3.50c
Bar iron, Philadelphia	3.685c
Bar iron, Cleveland	3.64c to 3.70c
Bar iron, New York	3.695c
Bar iron, Pittsburgh	3.50c
Hard steel bars, Chicago	3.25c
Cotton ties, Pitts., Nov.	$2.16

RAILS, TRACK MATERIAL

Angle bars, Pittsburgh, base	3.75c to 4.00c
Angle bars, Chicago, base	3.25c to 4.00c
Standard bessemer rails, mill	$38.00
Stand. open hearth rails, mill	40.00
Light rails, 25 to 45, mill	3.00c
Relaying rails, light, St. L.	75.00 to 80.00
Spikes, railroad, Pittsburgh	4.50c to 5.00c
Spikes, railroad, Chicago	5.00c to 5.25c
Track bolts, Pittsburgh	6.50c to 8.10c
Track bolts, Chicago	5.25c to 6.50c
Tie plates, Chicago	$70.00 to 75.00

WIRE PRODUCTS

(Per 100 lbs. to jobbers; retailers 5c more)

Wire nails, Pittsburgh	$3.50
Coated nails, Pittsburgh	3.45
Plain wire, Pittsburgh	3.25
Galvanized wire, Pittsburgh	3.95
Polished staples, Pittsburgh	3.65
Galvanized staples, Pittsburgh	4.35
Barb wire, painted, Pittsburgh	3.65
Barb wire, galvanized, Pitts.	4.35
Cut nails, Pittsburgh	....

CHAIN, PILING, STRIP STEEL

(In cents per pound)

Chain, ⅜ in. proof coil, Pitts. 8.00c

Sheet piling, base, Pittsburgh 4.00c to 5.00c

Cold rolled strip steel, hard coils, 1½ inches and wider by 0.100 inch and heavier, base per 100 pounds, 6.50c.

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SHEETS

(In cents per pound.)

SHEET MILL BLACK

No. 28, open hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c
No. 28, open hearth, Chic.	5.215c

TIN MILL, BLACK

No. 28, open hearth, Pitts.	5.00c
No. 28, bessemer, Pitts.	5.00c

GALVANIZED

No. 28, open hearth, Pitts.	6.25c
No. 28, bessemer, Pitts.	6.25c
No. 28, open hearth, Chic.	6.465c

BLUE ANNEALED

No. 10, open hearth, Pitts.	4.25c
No. 10, bessemer, Pitts.	4.25c
No. 10, open hearth, Chic.	5.715c to 6.215c
No. 10, open hearth, Phila.	4.435c

TIN PLATE

(Per 100 lb. box)

Tin plate, coke base, Pittsburgh $7.75

IRON AND STEEL PIPE

Base Pittsburgh

Base Pittsburgh	Black Per cent off	Galv. Per cent off
¼ to 3 in., butt, steel	51	37½
¼ to 3 in., butt, iron	33	17

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	.30
Iron, 3½ to 4½ inches, c. l.	12½

CAST IRON WATER PIPE

(Class B Pipe.)

Four-inch, Chicago	56.50
Six-inch and over, Chicago	53.50
Four-inch, New York	57.50
Six-inch and over, New York	54.50
Four-inch, Birmingham	48.00
Six-in. and over, Birmingham	45.00

Class A pipe is $1 higher than Class B.

HOOPS, BANDS, SHAFTING

Hoops, Pittsburgh	3.50c
Bands, Pittsburgh	2.90c
Shafting, Pittsburgh, carloads	17 off to list

RIVETS

Structural rivets, Pittsburgh	4.65c
Boiler rivets, Pittsburgh	4.75c
Rivets ⅞ in. and smaller, Pitts.	45 and 10 off

NUTS AND BOLTS

(Delivered within 20-cent freight radius.)

CARRIAGE BOLTS

(⅜ x 6 inches, smaller and shorter)

Rolled thread	50–5 off
Cut thread	40–10–5 off
Larger and longer	40 off

MACHINE BOLTS

(⅜ x 4 inches, hot pressed nuts)

Rolled thread	50–10–5 off
Cut thread	50–5 off
Larger and longer	40–10 off
Cold pressed semi-finished hexagon nuts ⅝ in. and larger	60–10–10 off
Cold pressed semi-finished hexagon nuts ⅝ in. and smaller	70–5 off
Gimlet and cone point lag screws	50–10 off

NUTS

Hot pressed, square blank	2.50c off
Hot pressed, square tapped	2.30c off
Hot pressed, hexagon blank	2.30c off
Hot pressed, hexagon tapped	2.10c off
Cold pressed, square blank	2.25c off
Cold pressed, square tapped	2.00c off
Cold pressed, hexagon blank	2.25c off
Cold pressed, hexagon tapped	2.00c off

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products December 5, average for November 1917, average for September 1917, and average for December, 1916. Prices are those ruling in the largest percentage of sales at the dates named

	Prices Dec. 5, 1917.	Average prices Nov., 1917.	Sept., 1917.	Dec., 1916.
Bessemer pig iron, Pittsburgh..	$37.25	$37.25	$48.27	$35.95
Basic pig iron, Pittsburgh.....	33.95	33.95	43.95	30.95
*No. 2 Foundry pig iron, Pitts.	33.95	33.95	48.95	31.70
*No. 2 Foundry pig iron, Chic.	33.00	33.00	49.50	29.25
Lake Superior Charcoal, Chicago	37.50	37.50	59.50	32.00
Malleable, Chicago	33.50	33.50	49.50	29.25
**Southern, No. 2, Birmingham.	33.50	33.50	43.50	23.00
*Southern Ohio No. 2, Ironton.	33.00	33.00	49.50	30.00
Basic, eastern Pa.....	33.00	33.00	49.50	30.00
**No. 2X Virginia, furnace....	33.50	33.50	50.75	26.00
**No. 2X foundry, Philadelphia.	34.00	34.00	53.25	29.50
Ferro mang., delivered.....	240.00	247.00	378.00	160.00
Bessemer billets, Pittsburgh....	47.50	47.50	73.75	58.75
Bessemer sheet bars, Pittsburgh	51.00	51.00	82.50	58.75
Open hearth sheet bars, Pitts..	51.00	51.00	82.50	58.75
Open hearth billets, Pittsburgh.	47.50	47.50	73.75	58.75
Steel bars, Pittsburgh.....	2.90	2.90c	3.725c	2.925c
Steel bars, Chicago.....	2.90	2.90c	4.10c	3.10c
Iron bars, Philadelphia.....	3.685	4.335c	4.935c	3.059c
Iron bars, Cleveland.....	3.64	4.00c	4.50c	3.00c

	Prices Dec. 5, 1917.	Average prices Nov., 1917.	Sept., 1917.	Dec., 1916.
Iron bars, Chicago mill.....	$3.50	4.10c	4.50c	2.85c
Beams, Chicago	3.00	3.00c	4.46c	3.20c
Beams, Pittsburgh	3.00	3.00c	3.75c	3.025c
Beams, Philadelphia	3.185	3.185c	4.435c	3.409c
Tank plates, Pittsburgh.....	3.25	3.25c	6.8125c	3.525c
Tank plates, Chicago.....	3.25	3.25c	7.33c	3.75c
Tank plates, Philadelphia.....	3.435	3.435c	7.75c	4.159c
Sheets, blk., No. 28, Pittsburgh	5.00	5.30c	8.75c	4.50c
Sheets, blue anld., No. 10, Pitts.	4.25	4.60c	8.50c	4.00c
Sheets, galv., No. 28, Pittsburgh	6.25	6.50c	9.6875c	6.25c
Wire nails, Pittsburgh.....	3.50	$3.50	$4.00	$3.00
Connellsville fur. coke.....	6.00	6.00	9.625	4.44
Connellsville fdy. coke.....	7.00	7.00	12.50	6.00
Heavy melting steel, Pittsburgh	30.00	29.60	35.50	25.00
Heavy melting steel, eastern Pa.	28.00	27.50	31.25	24.00
Heavy melting steel, Chicago...	28.50	.....	.....	.....
No. 1 wrought, eastern Pa.....	35.00	35.70	44.50	27.00
No. 1 wrought, Chicago, net ton	31.00	30.60	36.25	25.35
Rerolling rails, Chicago.....	35.00	35.70	41.25	29.50
Car wheels, Chicago.....	29.00	27.50	31.00	21.85

*1.75 to 2.25 silicon. **2.25 to 2.75 silicon.

(For Additional Prices See Page 1246)

Pig Iron Demand Exceeds Supply

Consumers Besiege Furnaces With Inquiries But Little Tonnage Can Be Accepted by Producers—Unsatisfied Basic Requirements Now Reach 200,000 Tons—Some Buyers Seek Iron For Last Half of 1918

Cleveland, Dec. 4.—An even more acute scarcity of basic iron is the outstanding feature of the pig iron market in the Cleveland district. Inquiries for this grade are pouring into Cleveland sellers from all parts of the country and it is estimated the aggregate of these within the past week has been from 150,000 to 200,000 tons. Most of the inquiries that came out two weeks ago still are open as the consumers are unable to locate unsold metal. Producers are unable to determine whether or not they will have any open tonnage to July 1, owing to poor working conditions caused by coke shortages. Marketable supplies of foundry iron have grown exceedingly scant and this situation has been further complicated by the fact that a number of furnaces have turned from this grade to basic. Practically no northern foundry is available for the first half. Some Alabama iron, however, is being sold in this territory at $33, furnace, from 1.75 to 2.25 silicon. One house sold 2500 tons. Malleable also is practically unattainable. A Wisconsin buyer came into this territory this week seeking 2500 tons. In basic a new inquiry for 15,000 tons for the first half has appeared from Massillon, O. A Lorain steelmaker remains in the market for 10,000 tons, and an Ohio river mill for 15,000 tons for the next three months. A Pittsburgh consumer seeking 5000 tons for December to cover war business has closed, of which 3000 tons is to come from a lake producer. Orders for 400 tons of special malleable and 200 tons of foundry covering work for the Emergency Fleet corporation have been distributed to furnaces in this district. A large Youngstown consumer has closed for 8000 to 10,000 tons of 8 and 9 per cent silveries for extended shipment. Part of this tonnage went to Tennessee furnaces.

Supplies Are Lacking

Boston, Dec. 3.—The local pig iron market has done little during the past week, and the holiday interruption was not the chief cause. The lack of available iron largely is responsible for the rather light volume of business. Such business as is passing is almost entirely supplementary or to piece out and while there are occasional inquiries for lots of 500 tons, most of the calls are for 100 and 200-ton lots. Difficulty is reported in filling even such orders, as the furnaces everywhere are sold up for the first quarter of 1918 and about the only iron available is that which stacks turn out in excess of estimates. Thus the furnaces are in the market one day only to be out of it the next. Altogether it has been a rather featureless week. The coke situation in New England has not been quite as bad as in some other districts. On the matter of pig iron supplies local foundries also have not suffered as have those in other regions. New England melters always are inclined to buy a better grade of iron than is needed; it is not uncommon practice for them to take 2.50 to 3 silicon when 2 to 2.25 would do. The result is that they have their castings and scrap which otherwise would not be available. The New England Coal & Coke Co. now is quoting coke at $12.85 per gross ton, ovens, and is offering freely at that figure. Connellsville coke can be

bought here at a rate of $3.65 per ton with a rate of $3.45.

Inquire for Last Half

New York, Dec. 4.—While demand for pig iron continues of huge proportions, the volume of business is greatly restricted by the lack of supplies. Generally eastern furnaces are sold up to July 1, and in no case does the unsold output represent much tonnage. So urgent has been the demand that furnaces have been able to rid their yards of accumulations of off-iron, which under normal circumstances would be rather difficult to sell. Several consumers, foreseeing a continued shortage of iron and believing their chances of receiving their requirements will be increased by securing reservation on furnace books, have started to inquire on second half of 1918. No sales for this distant position yet have been made, since furnaces feel they have nothing to gain by committing themselves so far ahead. Among current inquiries are a number for low phosphorus iron which total at least 10,000 tons. Inquiries for foundry include numerous blocks, ranging from 1000 to 5000 tons. The National Enameling & Stamping Co. recently inquired for a round tonnage of basic for its St. Louis plant, but is not known to have closed.

Unable to Obtain Iron

Pittsburgh, Dec. 4.—Inquiries for pig iron have decreased during the past week. While they continue to be numerous, the decline is no doubt due to the fact that consumers are aware that producers have no tonnages to sell. Most of those who have come into the market during the past few days are seeking relatively small lots of foundry and steelmaking grades. No offerings of any kind are being made and the acute shortage has not been relieved. The fact that the coke situation is somewhat better has given rise to the hope that the pig iron output may be increased soon. Action taken by the general operating committee of the eastern railroads organized to pool equipment and traffic of carriers east of Chicago promises to bring about effective results. This committee has issued different orders, some of them sweeping in character, in an earnest effort to relieve traffic congestion. So far as reported no furnaces in the greater Pittsburgh district found themselves able during the past week to close for any of the numerous large requirements that have developed during the past two weeks. The tonnage booked in November for first quarter and first half delivery by furnaces in the Greater Pittsburgh district are relatively light. One large steelmaker who has been short of steelmaking grades has obtained considerable tonnage from middlemen by an exchange of sheet bars. According to averages of W. P. Snyder & Co., sales of standard bessemer and basic iron of 1000 tons or more in November were entirely at the government figures of $36.30 and $33, furnace, respectively, the same as in October. The averages for November, 1916, were $29.12 and $27.22, valley, for bessemer and basic, respectively.

Heavy Inquiry, Few Sales

Buffalo, Dec. 4.—A tremendous volume of inquiry has struck the pig iron market at a time when furnaces of the district are in a practically sold-up conditions and are refusing to contract even with old customers. The tonnage of sales for the past week has been comparatively insignificant. The fact that so many furnaces in the district are not producing makes the seller more than ever shy of taking on contracts which he is uncertain he can fill on scheduled time. One furnace is entirely sold up for the first half of 1918 and declines to quote beyond. Generally the furnaces are not prepared to take on business for delivery within six or seven months. Some interests are booking the order after explaining to the buyer the impracticability of attempting to guarantee delivery. There is a great inquiry for foundry, malleable and basic. The few hundred tons that have been disposed of have been principally foundry and malleable. Great pressure on the part of the government for munition steel is resulting in furnaces working principally on government pig iron. One of the features that militates against contracting is that furnaces must take measures not to over-book and to reserve a portion of future tonnage for government use. Coke shortage continues to curtail production.

Southern Sold at Cincinnati

Cincinnati, Dec. 3.—Although freight rates ordinarily would prohibit the shipment of southern foundry iron to Cincinnati, under present price conditions, a number of sales have been made to both local and nearby melters. Practically all of these bookings were for the first half and for No. 3 foundry iron. The government's schedule leaves no room for a change in prices, and none has been attempted. A southern Ohio melter is still in the market for 15,000 tons of basic iron, which appears to be unobtainable from furnaces near this company's plant. Both basic and malleable are as scarce as No. 2 foundry iron. It is now almost ancient history to repeat the scarcity of high silicon iron. The Jackson County furnaces have none to offer for nearby shipment.

Hunt For Future Metal

St. Louis, Dec. 3.—The situation in pig iron here is described by dealers as increasingly tight. Conditions of supply and demand are such that but for the government regulation prices would be soaring. As it is, however, the market is quiet. Among several of the most important consumers there is growing apprehension relative to future supplies. These buyers are casting about in all directions to cover their needs, and are buying everything available. To date, however, no mill or foundry has suffered actual want. Local brokers declare it is increasingly hard to get Birmingham producers to offer tonnages. They all seem to be sold up until the middle of 1918, and as for immediate shipment, the best obtainable is an occasional isolated car. Producers in the St. Louis district still are out of the market.

Consumption has not fallen off, and many of the leading manufacturers report enough business booked to keep them working at capacity well into the spring.

Southern Production Reduced

Birmingham, Ala., Dec. 4.—Small sales still are the usual transactions of the southern pig iron market. There are reports of some large sales, but these cannot be confirmed. Inquiries are numerous. Local consumers are urging concessions of all or a part of the freight from Birmingham to Pittsburgh. The government schedule of $33, furnace, for No. 2 northern analysis, however, is being maintained. Pennsylvania, the middle west and other sections are represented in the inquiries in this territory. While embargoes are on in some directions, one railway system declining any and all shipments of iron, the deliveries show a little improvement out of the Birmingham district. Production is reduced. By reason of fire destroying the tipple and coal washer at its Sayreton mines, the Republic Iron & Steel Co. finds its coke supply cut down and two furnaces of the Thomas group in Birmingham have been blown out. This cuts down production not less than 500 tons per day. The temporary tipple will be put up immediately, but it will be several months before

the coal washer can be rebuilt. The Alabama Co. is pushing the repairs of its Ironton furnaces. The same company has plans in hand for practically rebuilding the No. 2 furnace at Gadsden, which will permit the two furnaces to be operated at the same time. The Trussville furnace has not been started because of the coke shortage. A large tonnage of iron yet is to be delivered by southern makers on old contracts. There is less than 5 per cent unsold for the first half, but only a few thousand tons have been sold for the last half.

Inquiry Going Begging

Philadelphia, Dec. 3.—To such an extent has the output of pig iron been sold ahead that practically all of the furnaces are refusing to quote excepting in special instances. As a result, there is a big volume of inquiry which is going begging. One important eastern furnace which sold all but a fraction of its first half output, will dispose of the remainder only to melters engaged in making castings for the government, direct and indirect, and who will guarantee that the metal will be used in such work. In a growing number of cases consumers are waiving requirements of analysis and will take anything that answers the definition of pig iron. One eastern steelmaker who recently bought 6500 tons of basic to replace tonnage lost from an idle furnace during the past week, purchased 500 to 1000 tons of bessemer on account of not being able to get additional basic. The American Bridge Co. during the week picked up some basic and off grades enlarging its recent purchases to 25,000 to 30,000 tons. Consumers generally have been disinclined to cover themselves further ahead than first half. During the past week, the National Radiator Co. put out an inquiry for 12,000 tons for the second, third and fourth quarter requirements of its Johnstown and Trenton plants.

Chicago Has Heavy Inquiry

Chicago, Dec. 4.—Although local producers of pig iron have practically nothing to sell for delivery up to the middle of 1918, a heavy inquiry is being entertained. This is principally for basic and malleable. It is estimated approximately 50,000 tons of basic have been inquired for in the past few days, principally by users in the St. Louis district. These interests recently bought considerable basic, but apparently did not obtain as much as they will require during the first half. It is understood some malleable users in Illinois have been able to place orders with eastern furnaces.

Adopt Relief Plan in Coke

Committee Largely of Operators Will Regulate Shipments to Prevent Cross-Hands—Traffic Congestion and Labor Conditions Improve

Pittsburgh, Dec. 4.—With a view to relieving the shortage of the coke supply, a committee composed of operators with one exception was organized in Pittsburgh, Monday to regulate shipments out of the Connellsville regions and to eliminate, so far as possible, cross-shipping. It has been pointed out that the natural movement of coke from the south end of the region is to the west and from the north to the east. It will be the purpose of the committee to adjust movements along this line, thus making traffic move over the shortest routes. It is realized that complications may arise, making it impossible to entirely eliminate cross-shipping, but it is believed that a long step in this direction can be taken. It will call for the trading among coke consumers of tonnages at different oven plants in the Connellsville region. Also it may be found that some furnaces accustomed to specific rates of coke will find it impractical to substitute other grades. The committee believes, however, that the project under way will be effective in relieving the car congestion and the burdening of the railroads. The committee appointed consists of R. H. Fry, Orient Coke Co., Uniontown, Pa., chairman; John Jamison, Jamison Coal & Coke Co., Pittsburgh; M. D. Flannigan, J. H. Hillman & Sons Co., Pittsburgh; C. B. Faree, E. W. Mudge & Co., Pittsburgh; W. L. Byers, Producers Coke Co., Uniontown, Pa.; John McElwain, W. J. Rainey & Co.; Charles L. Doyle, traffic commissioner, American Pig Iron association. The congestion in the Connellsville region has been relieved considerably and labor conditions are improved. In consequence, shipments have been freer, particularly in east-bound traffic. The car supply yesterday and today averaged 60 per cent and tomorrow it is expected to be 30 per cent. Coke production for the week ended Nov. 29, was 316,017 tons, as compared with 306,240 tons for the preceding week, according to *The Connellsville Courier*.

Offers Fuel at $15

New York, Dec. 4.—The New England by-product cokemaker now is offering first half contracts at $15, delivered, and has booked considerable business at this price. The new figure is based upon $7, Connellsville ovens. To the latter is added $3.65 freight from Connellsville to New England, a charge to cover the freight on the coal used in making this coke and the average freight to New England consuming points.

Foundries Running Close

Cincinnati, Dec. 3.—"Nothing but trouble" is the reply of a prominent coke dealer in answer as to what was pending. Shipment conditions in all districts emphasize that transportation is equally as important as production. More than one nearby foundry has less than a week's supply of coke, while iron furnace operators are doing everything possible to get coke due on former contracts.

Outside Inquiry Heavy

St. Louis, Dec. 3.—Dealers report no change worthy of note in the coke situation. The situation has been cleared materially in this general region by announcement by the government of the price on by-product coke. There continue numerous complaints of deliveries on contract from eastern ovens but have reference mainly to tonnages sold outside the district.

Demands Continue Strong

Birmingham, Ala., Dec. 4.—Demand for coal and coke in southern territory still exceeds production, although it is stated the latter is greater than ever before. All producers of coal and coke are maintaining the federal schedule of prices. Consumers are willing to pay more if they could get contracts for coal accepted. The latter is impossible by reason of old contracts in hand. The manufacturers of coke also are going slow in making contracts. Many of the existing contracts on coke are near completion. Sales of coke are being made daily but in almost all instances the lots are small. Some of the railroad lines found it necessary recently to go begging in this district to get enough coke to keep their own shops going and smaller industries on the railway lines also were assisted. While contentions continue between union miners and operators, there is no apprehension that production will be interfered with in the near future. Conferences were held with the fuel administrator in Washington the past week and will be renewed this week. Arbitration will likely follow.

Demand Lifts Scrap Prices

Shortage of Pig Iron an Important Factor in Stimulating Brisker Buying—Market Handicapped by Traffic Conditions

FOR COMPLETE SCRAP PRICES SEE PAGE 1246

Chicago, Dec. 4.—Slightly higher prices are being quoted on some items in the iron and steel scrap market as an increasing demand is manifested. Almost all consumers are taking some material, but the market is not what would be considered active and buying is much less than had been expected. Heavy steel material remains practically unchanged, with advances principally on the net ton products. A peculiar situation has arisen as to No. 1 railroad wrought. The net ton fixed price on this is $31.25. However, that price is being obtained by railroads for materials on cars at their yards, leaving no provision for freight charges or a profit to the broker. As a result, buyers of this material in many cases are paying a commission to brokers for obtaining the material for them. This makes necessary a quotation of $31.25 to $32.25 for this material, delivered in consumers' yards, although the latter figure is in excess of the fixed price announced by the government. The Great Northern offers 6500 tons of steel rails and the Chicago & North-Western 4900 tons of scrap, in which is included 1000 tons of rails and 600 tons of No. 1 wrought.

Iron Scarcity a Factor

New York, Dec. 4.—Local foundries continue active buyers of cast scrap, due to the difficulty they are encountering in obtaining pig iron. Wrought scrap also continues in fair demand. Steel scrap, however, is dull, excepting for a little trading between dealers, which has resulted in advancing prices to $25 to $26, New York.

Can't Move Material

Boston, Dec. 3.—There is no lack of opportunities for business in scrap but local dealers complain that because of the railroad embargoes and other transportation troubles it is hard to move much material either in or out. Prices are inclined to go up because of the scarcity but the dealers are rigidly adhering to the government schedules. Dealers paying prices per gross ton, f.o.b. shipping points, follow: Wrought No. 1 long, $28 to $29; horse shoes, $28 to $29; cotton ties, $20 to $21; stove plate, $19 to $20; No. 1 machinery, $30 to $30.50; No. 2 machinery, $28 to $29; car axles, steel, $42 to $44, iron, $49 to $50; rerolling rails, $50; iron boiler plate, $34 to $35; bundled barrel hoops, $17.50 to $18; wrought iron pipe, $24 to $25; steel rails, $25 to $26; No. 1 railroad steel, $25 to $26; heavy melting steel, $24 to $25; axle turnings, $18 to $19; machine shop turnings, $15 to $16; cast borings, $17 to $17.50; drop forge trimmings, $21 to $22; cast iron car wheels, $30 to $32.

Active Demand at Pittsburgh

Pittsburgh, Dec. 4.—Active demand continues to be made by consumers for practically all grades of scrap. The most pressing requirements are for heavy melting steel and some fairly large tonnages of this grade have been sold during the past week. The Carnegie Steel Co. recently closed for a round lot, said to be between 15,000 and 20,000 tons, for Munhall, Pa. The price paid is understood to have been the government level of $30, delivered. Dealers report that they are unable to meet fully the demands and are having difficulty in making shipments and obtaining supplies, owing to embargoes. Demand for scrap, however, has increased on account of the shortage of pig iron. The stocks of old material of both dealers and consumers are reported to be unusually low. Some users are said to be entirely without reserve tonnages.

Pittsburgh Buying Shut Off

Philadelphia, Dec. 3.—Further advances in prices on heavy melting steel here are serving in effect to cut this district off as a source of supply for Pittsburgh, which has been buying freely in the past. The eastern Pennsylvania market on heavy steel now is $27 to $29, which, owing to the $3 freight rate from Philadelphia, puts the Pittsburgh price above the government maximum of $30, delivered. Demand in this district has been fairly brisk during the past week, but involved only small tonnages. A good deal of activity developed from transactions between dealers in heavy melting steel. Scarcity of No. 1 railroad wrought has resulted in considerable unfilled demand for this grade. It is said that considerable more wrought scrap could be obtained were it not for the government maximum price of $35, delivered, which is regarded by many sellers as too low. Rerolling rails now are quoted at $37 to $40, an advance of $3. Machine shop turnings are $18.50 to $19.50, or 50 cents up.

Heavy Demand Lifts Market

Buffalo, Dec. 4.—The market for iron and steel scrap in this district is exceptionally strong with as brisk an inquiry from without the district as from within. The demand is coming from every quarter. With a market of extraordinary strength, there is a decided scarcity of material, due to inability on the part of dealers to work tonnage through their yards, because of inability to get cars and labor. One dealer is said to have been offered $50 a ton for heavy melting steel but turned it down because he could not guarantee prompt delivery. Dealers believe that a uniform price of $40 for heavy melting steel would establish itself if it were not for price restrictions. As it is, heavy melting steel is now at the full regulated figure of $30. The demand is heavy for low phosphorus, No. 1 railroad wrought, cast scrap, car wheels, turnings and borings, also. No. 1 railroad wrought is selling for $35 and the following quotations reflect the strength in other grades: No. 1 railroad machinery and cast scrap, $30 to $31; car wheels, $32 to $33; railroad malleable, $29 to $30; axle turnings, $26 to $27; low phosphorus, $40 to $42; stove plate, $21 to $22; No. 1 busheling scrap, $26 to $27.

Mills Want Railroad Wrought

Cincinnati, Dec. 3.—No. 1 railroad wrought is wanted by the rolling mills, but shipping restrictions to some districts are becoming a problem that is hard to solve. Traffic managers of different companies are doing their best to co-operate with the railroads, but they are unable to overcome difficulties that are beyond their control. Changes in prices are confined to stove plate which is a trifle stronger.

Embargoes Retard Buying

Cleveland, Dec. 4.—Consumers of scrap ready to buy are uncertain whether it is worth while to do so because of the embargoes and the generally congested condition of the railroads. Several are waiting to see how the pooling plan of the railroads between Chicago and the eastern seaboard works out. Not a ton of scrap is permitted to be sent into some of the plants. Hundreds of cars are on track in this district awaiting movement. In some cases it has taken a car of scrap a month and more to move across the city. Compara-

tively little December buying is being done although a consumer here and there has opened negotiations; but demand is expected to loosen up in a week or so, if traffic conditions are not prohibitive. There is little optimism on this point. General prices have about simmered down in accordance with the levels established by the government. Quotations for the last fortnight have not changed appreciably but the undercurrent is inclined to be bullish.

Heavy Steel Buyers Close

St. Louis, Dec. 3.—The St. Louis market for iron and steel scrap is gradually adjusting itself to the government levels, and has reached a point where a heavy volume of actual business may be looked for in the near future. Prices are strong and while no changes in quotations are noted, the tendency is decidedly in the direction of the maximum levels. Stocks of principal melters are unusually low. One of the larger mills was reported this week to have covered requirements by contracts extending until the middle of next year and a consumer of heavy melting steel has covered for the next 90 days, paying the maximum government price. Dealers are bullish and during the past two weeks have been picking up all the miscellaneous scrap they can find. Offerings from all sources continue light, especially from carriers. Railroad congestion and embargoes have further emphasized the scanty supply of material.

Southern Market Firmer

Birmingham, Ala., Dec. 4.—The iron and steel scrap market in the south is stronger, but material is scarce. Quotations are firmer with a slight advance in one or two grades. Embargoes east of the Ohio river prevent dealers in southern territory from considering business that is being offered from various sections, especially from Pennsylvania. Inquiries continue numerous and consumers in the home territory still are unwilling to pay the prices fixed by the government. On heavy melting steel, however, some of the larger melters have been more inclined to raise their offers. Quotations for heavy melting steel have been far below the government figure.

The Wright Roller Bearing Co. is moving its Spring City, Pa., plant to Philadelphia, where it recently purchased the old Lubin moving picture plant, Twentieth street and Indiana avenue.

Many Seeking Sheet Bars

Consumers Find Mills Reluctant to Take Contracts—Some Exchange Deals Made—More Slabs Allotted by Government

Pittsburgh, Dec. 4.—Inquiries for round tonnages continue to come to makers of sheet bars although these have shown a falling off during the past week. Consumers also are seeking tonnages of billets. Makers, however, are compelled to decline new business and are being sold up. Tin plate producers have been especially active in seeking sheet bar tonnages but so far have been unable to cover their requirements.

Selling Bessemer Bars Only

Youngstown, O., Dec. 5.—Manufacturers of sheet bars are accepting no business that will interfere with government requirements. What tonnages that are being sold are of bessemer stock, and regular customers only are being supplied. At present the production of bessemer sheet bars is hindered considerably due to the coal shortage. The entire bessemer plant of one mill was idle for over 10 days. No open-hearth sheet bars have been sold by valley makers since the government began placing shell steel orders calling for this quality of steel. The leading maker of sheet bars is completely out of the market.

Many Want Sheet Bars

Cleveland, Dec. 4.—A heavy tonnage continues to be represented by pending inquiries for sheet bars. Virtually every sheet mill in this part of the country is in the market for steel covering requirements for first quarter or first half. Only in occasional instances, however, have they been accommodated as semifinished producers are going slow in booking future obligations in view of heavy government demands, unless orders have official approval. A 25,000-ton inquiry in northern Ohio remains open. Some sheet bars are being marketed by middlemen who have received them from steelmakers in exchange deals for basic pig iron. Steelmakers in this district continue to receive orders for slabs placed through government channels which are to be shipped to designated plate mills.

Strip Market Picks Up

Pittsburgh, Dec. 4.—Makers of cold-rolled strip steel report business has begun to pick up, now that the government has established a price of 6.50c, Pittsburgh. As soon as automobile interests and manufacturers of motor accessories have accumulated heavy shipments their demand is expected to become more active. Makers of automobiles and accessories had cut down their requirements on the strength of reports that the automobile industry would be reduced 40 per cent by the government. It was found, however, the government could not supply them with war orders sufficiently to cut normal production to that extent. As a result, automobile plants are operating at from 80 to 90 per cent capacity. Makers of cold-rolled strip steel are operating at about 60 per cent capacity and this is expected to be increased shortly.

Confused Condition

Exists in Warehouse Market at Boston—Price Adjustment Continues

Boston, Dec. 3.—Local jobbers in steel and iron products are very much up in the air as to what course to pursue with regard to prices. They are not able to buy at the prices established at the mills by the government and to be obliged to sell at prices based on present mill prices means a big loss to them on practically everything they sell. There are some concerns which are right down to the government basis but most of the local jobbers are holding at prices well above this level with an idea of saving some of the loss that faces them. Quarter-inch plates, for instance, on the government basis would be 4.46½c, Boston, while there are local houses that have supplies on hand that stand them 10c, Pittsburgh. Quotations are more or less nominal, with a wide variation among the different houses.

Warehouse quotations follow: Plates, 6.75c; structural shapes, 5c to 5.50c; steel bars, small, 5c; shrapnel bars, 6c; iron bars, 5c; 28 gage black sheets, 7.50c; 28 gage galvanized sheets, 8.25c; 10 gage blue annealed sheets, 6.85c.

Now Quote Uniformly

Cleveland, Dec. 4.—All Cleveland jobbers now are quoting uniformly the recommended prices on warehouse products. These are 3.98½c for iron bars, 4.03½c for steel bars, 4.13½c for structural shapes, and 4.38½c for plates.

Essentials Govern Sales

Bar Consumers Find Difficulty in Placing Contracts—Some Makers Note Drop in Specifications—Concrete Bars at 3.25c

Chicago, Dec. 4.—Government requirements continue to dominate the market and opportunity to place contracts for soft steel bars is almost lacking to domestic consumers not possessing priority certificates. Specifications against contracts are excellent and shipments from mill are in fair tonnage, although inability to obtain fuel is restricting production of pig iron at steel works with the corresponding decrease in the supply of ingots. One important interest estimates it is 2000 tons per day below its possibilities on this account. The car situation is becoming worse than late last summer and fall and it is expected an embargo will be placed shortly on shipments of steel to manufacturers of articles classed as nonessential. One producer of bars and small shapes recently quoted on some export business, asking from 4.25c down to 3.50c with the result that no orders were placed. From this it is believed that some producers are selling export bars at about 3.50c, Pittsburgh. Hard steel bars remain quotable at 3.25c to 3.50c, Chicago mill, though it is understood a recommendation of an agreed price of 3.25c mill, without extras for carbon or twisting has been made by the makers. There is no demand and practically no new selling. Mills are not working at full capacity. Bar iron is being sold at 3.50c, Chicago mill, for first quarter. Some consumers are entering their contracts in order to be sure of a place on rolling schedules but the fact that prices are fixed is preventing others from making contracts. In case railroads obtain an advance in rates, it is expected a heavy demand will develop from that direction.

Specifications Fall Away

Cleveland, Dec. 4.—Inquiries for considerable quantity of 5, 6 and 7-inch forging rounds for gun carriages are current in this district. Considerable additional tonnage of merchant steel for a further large number of escort wagons for the army also is before the mills. Wagon manufacturers are well occupied with this class of orders. Some good-sized inquiries for bars remain unplaced, including 1200 tons of screw stock and a large quantity of soft steel rounds for northern Ohio manufacturers. There continues to be more or less selling for future delivery at the government price of 2.90c, Pittsburgh, for soft steel bars and other makers are preparing to open their books for first quarter on this basis. Less pressure to get steel on the part of various buyers is shown and specifications have declined accordingly. Reinforcing bars now are quoted at 3.25c, mill, with no extras for twisting or carbon. While no official announcement has been made, it is understood that this price has been recommended by the makers for general adoption.

Concrete Bars in Demand

Philadelphia, Dec. 5.—With the exception of concrete bars, there is practically no activity in the steel bar market in this district. Domestic demand for concrete bars is fairly good since numerous structures which ordinarily would be built of steel now are to be constructed of concrete. Several export sales, including one lot of 3000 tons, are held up due to inability to get licenses.

Small Tonnages Sold

Pittsburgh, Dec. 4.—Light tonnages of steel bars have been sold in the Pittsburgh district during the past week at the government price of 2.90c, Pittsburgh. Mills are practically out of the market, but are able to supply regular customers with small lots now and then.

Bolt, Nut and Rivet Market Active

Pittsburgh, Dec. 4.—New business is coming to makers of bolts, nuts and rivets in fairly large volume. Requirements are chiefly for the government, directly or indirectly. Manufacturers still are unable to obtain steel bars at the fixed price of 2.90c to cover ordinary domestic orders. Steel bar tonnages are obtained, however, at this price when they are to be government requirements.

Band Price Puzzles

Pittsburgh, Dec. 4.—While some makers are not taking band tonnages at the steel bar price of 2.90c, Pittsburgh, this figure is being quoted by a prominent producer and small tonnages have been closed at that level. Sales of hoop tonnages at 3.50c, Pittsburgh, have been made. This figure is taken to represent the level for material for hoop purposes, 13 gage and lighter, such as that used by coopers. Some makers claim that No. 12 and heavier products of hoop mills should not be sold on the bar price of 2.90c, Pittsburgh. So far as known no official action has been taken regarding the base and extras of hot rolled strip steel and hot rolled flat steel for cold rolling.

Shafting Buying Less Heavy

Pittsburgh, Dec. 4.—New business being placed by the government for cold rolled shafting is reported to show a falling off. Tonnages have been taken recently by the war department and the Emergency Fleet corporation. Domestic buyers have also taken tonnages at the recently established level of 17c, Pittsburgh, off the list. Makers are in a position to take domestic business, although it is not certain they will be able to take care of all requirements other than those for war purposes.

Firmer Tone

Shown in Ferromanganese and $235, Delivered Now Seems Minimum

New York, Dec. 4.—The tendency toward lower prices on ferromanganese definitely has disappeared and the market once more displays a firm tone for the first time in months. The $225 delivered figure no longer is heard. The lowest definite offer which has been made during the past week was $230, delivered, and it appears likely that less than $235 now could not be done. Inquiry during the past week has been in larger volume than of late. Not much business resulted, however, since consumers were inclined to insist upon lower prices than the producers would accept. In most cases consumers were unwilling to pay higher than $225.

Sales of about 1000 tons of spiegeleisen, including one lot of 500 tons for the Griffin Wheel Co., Chicago, have established the market on this metal at $59 to $60, furnace, for all deliveries up to next July. Not much inquiry now is current.

Scarcity of 50 per cent ferrosilicon again is being noted with the result that holders are asking higher prices. For metal for this year, around $175, delivered, now must be paid, while for the first half of next year the market may be quoted at $150 to $160, delivered. Inquiry is brisk, mostly for carload lots.

Alloy Inquiries Fewer

Pittsburgh, Dec. 4.—Fewer inquiries are coming to makers of ferroalloys. Domestic buyers apparently appreciate the fact that it is not possible to obtain tonnages for early delivery and in consequence are staying out of the

market. There appears to be a marked shortage of all grades of ferrosilicon. Eighty per cent ferromanganese continues to be quoted at $250 and less, delivered. Twenty per cent spiegeleisen is quoted at $60 to $65, furnace, but it is not improbable that small tonnages might be obtained at lower figures.

Brazilian Ore Sold

New York, Dec. 4.—Small sales of Brazilian manganese ore have been made recently on the basis of 65 to 70 cents per unit, f.o.b. Rio de Jeneiro, leaving to the seller the question of securing ships. No c.i.f. sales of Brazilian manganese ore have been made lately.

Indian Ore Brings $1.10

Philadelphia, Dec. 3.—Some 5000 to 6000 tons of Indian manganese ore have been sold here for delivery next year at $1.10 per unit, at seaboard. It is a question whether any more could be bought at this time, due to the lack of vessels. The shipping situation even more than before is the chief factor affecting manganese ore supply.

Tin Plate Orders

Placed by Government for Itself and Allies—First Half Sales

Pittsburgh, Dec. 4.—Orders for tin plate have been closed during the past week for the government and for the allies, but are understood not to have involved any considerable tonnage. The direct requirements of the government are small but those in connection with the food conservation program are large. Makers are taking contracts for first half delivery at the fixed price of $7.75, Pittsburgh, per base box, and will be in a position to meet all requirements provided they are able to obtain a sufficient supply of steel and there is no undue interference from traffic congestion.

Lays Pans for Expansion

The Groton Iron Works, Groton, Conn., and the Noank works, adjoining, both operated by the government, are making preparations to build 200 houses for 2000 employes who are to be secured to work in the new buildings now in process of erection. Two of the buildings are about half completed, a 150 x 350-foot fabricating or assembly plant and a 300-foot long storehouse. The government will expend $3,000,000 on the plants and will build merchant marine ships.

War Plate Needs Enlarged

Producers Hear Practically All 1918 Tonnage Will Be Required—Shipyards Buying Heavily—Many Boilers Are Wanted

Philadelphia, Dec. 3.—Eastern Pennsylvania plate mills are taking considerable business from shipyards in this district. Although the ships are for the government, by reason of the commandeering power vested in the United States shipping board, the shipyards themselves, now that prices have been fixed, are buying the materials. It is expected that orders will be allotted during the next few weeks by the Emergency Fleet corporation for the steel for 70 8000-ton troopships, to be built by the American International Shipbuilding Corp. Bids on some 182,000 tons of fabricated steel for these vessels are to be requested shortly. Outside of plates for government requirements, direct or indirect, the mills are not taking on much tonnage. One eastern Pennsylvania maker is taking on first quarter requirements of its regular customers, subject, however, to the understanding that government business will be taken care of first. Numerous inquiries continue to come from abroad.

No Tonnages Now Offered

Pittsburgh, Dec. 4.—Odd lots of plates which were put on the market early last week by makers in the Greater Pittsburgh district have been absorbed and it is understood no tonnages have been available since. Car makers have been able to keep themselves well supplied with plates to take care of car orders and are in a position to accept almost any amount of new business. No car contracts were closed during the week. It is understood the recent tentative order for 27,000 eight-wheel cars for Russia is being held up, pending the outcome of the unsettled situation in that country. Interest is manifested in a report that the government may aid the railroads by an appropriation of $100,000,000 for the purchase of rolling stock. The report does not appear to have come from any official source.

More Ship Tonnage Placed

Youngstown, O., Dec. 5.—Additional tonnage of plates has been contracted for by the government in this district. The order, while not as large as that alloted last week, calls for nearly 10,000 tons and will be used in the construction of merchant ships. Lately the production of plates in this territory has been hampered considerably by the decrease in coal shipments. However, the situation has cleared somewhat and nearly all mills are working at normal capacity.

Many Boilers Are Wanted

Cleveland, Dec. 4.—Another large government requirement now before the mills is represented by inquiries for 420 water tube boilers for steel vessels for the Emergency Fleet corporation upon which the shops now are bidding. The steel requirements of this order in plates and other forms are estimated at from 10,000 to 15,000 tons. These boilers are of a larger type than a large number for ship purposes which recently were distributed. The latter order now is stated to have been for wooden ships. Other heavy government demands for plates either are being made or are in prospect. The call for universal plates for war needs has grown considerably. Certain eastern mills which were taking specific tonnage freely from the general trade at 3.33c, mill, have withdrawn open price and quote only on submitted business. One buyer placed 800 tons. Local makers have further dropped prices and now are quoting from 4.25c to 5c, mill. An inquiry for 250 tons for the city auditorium is current. Steel is being distributed for the 40 government vessels recently taken by the American Shipbuilding Co. One independent mill received 4000 tons. Another producer has taken a larger amount and much of the tonnage still is to be placed.

Government Needs Full Output

Chicago, Dec. 4.—Information apparently from a reliable source indicates that the impression is becoming more fixed among steel men and government officials that the entire output of plates, both universal and sheared, from all producers during 1918 will be needed by the government for its own purposes. With this expectation in view, it is practically impossible to place any orders for plates for export. The leading independent recently received specifications for 1300 tons for plates and other finished material for four ships to be built by the American Shipbuilding Co., and also has been given considerable tonnage to furnish to fabricating shops in the west for the Emergency Fleet corporation.

Blast Furnaces Do Well in November

Production in Shorter Month Only 100,460 Tons Less Than in November and Daily Average is Increased by Small Margin—Numerous Stacks Forced to Bank Toward Close of Month

PIG iron production in November held close to the same level which has been maintained during the past nine months. Although the total production for the month shows a loss of 100,460 tons, the daily average gained 195 tons. The additions to the list of active stacks which have been made during recent weeks were offset largely by the banking of a number of furnaces. Difficulty in securing coke in the quantities and qualities desired operated to hold down the production and resulted in the banking not only of merchant furnaces which secure their supplies from outside interests, but also of steelworks or nonmerchant stacks, operated by companies which are largely self-contained. The month of November shows a net loss of 10 in the number of active stacks. Several of the furnaces, however, were blown out near the close of the month.

AVERAGE DAILY PRODUCTION.

	1917.	1916.	1915.	1914.	1913.
Jan.	101,930	102,319	51,323	60,624	89,929
Feb.	94,641	106,157	59,521	67,450	92,095
Mar.	105,026	107,343	66,009	75,534	89,123
Apr.	110,936	107,517	70,484	75,383	91,812
May	110,119	108,535	72,747	67,646	90,865
June	108,675	107,127	78,998	63,486	87,229
July	107,659	103,907	82,687	63,075	82,525
Aug.	104,483	103,156	89,510	64,403	81,839
Sept.	104,691	106,935	94,478	62,757	83,137
Oct.	106,320	113,167	100,656	57,007	84,933
Nov.	106,515	110,593	101,174	50,042	74,322
Dec.	.....	102,715	103,278	48,236	63,746
Av'ge	105,592	106,610	81,022	62,934	83,980

The coke and anthracite blast furnaces of the country produced a total of 3,195,466 tons of pig iron in November, compared with 3,295,926 tons in the previous month, a net loss of 100,460 tons. This falling off in tonnage is due to the fact that November is a 30-day month, as a comparison of the daily average production shows a gain. The blast furnaces produced on an average of 106,515 tons daily in November, compared with 106,320 tons in October, a net gain of 195 tons.

The steelmaking or nonmerchant furnaces produced 2,286,037 tons of pig iron in November, a loss of 74,766 tons compared with the October figure of 2,360,803 tons. The merchant stacks also showed a loss. The tonnage of merchant iron produced in November was 864,411, a loss of 16,527 tons compared with the October figure of 880,938 tons. The daily average production shows a gain of 96 tons by the steelmaking furnaces, the November daily average for these stacks being 76,201 tons, compared with 76,105 tons in October. November also shows a slight gain in the daily average production of the merchant stacks. The merchant furnaces produced 28,814 tons daily in November, compared with 28,417 tons in October, a gain of 397 tons.

Some of the loss in tonnage last month is due to the fact that the production of both spiegel and ferro fell off slightly. In November, 16,330 tons of spiegel were produced, a loss of 7099 tons compared iwth the October total of 23,429. The ferro production shows a loss of 2068 tons, the total for November being 28,688, and for October, 30,756.

NOVEMBER PIG IRON

States.	No. of stacks.	No. in blast last day of month. Nov.	Oct.	Total tonnage made. Merchant.	Non-Merchant.	——Totals—— Nov.	Oct.
Pennsylvania	160	134	137	241,331	1,019,054	1,260,385	1,295,967
Ohio	79	63	72	183,595	505,796	689,391	744,996
Alabama	46	32	33	141,183	103,924	245,107	258,240
Virginia	21	15	14	47,410	.....	47,410	48,155
New York	27	21	22	71,025	116,704	187,729	202,608
New Jersey	6	5	5	27,319	.....	27,319	25,436
Illinois	24	20	21	42,580	234,717	277,297	276,494
Colorado	6	4	4				
Indiana	14	14	13	25,717	252,413	278,130	259,852
Maryland	4	4	4				
Wisconsin	6	4	4				
Kentucky	7	5	3				
West Virginia	4	4	4	48,005	26,963	74,968	70,029
Tennessee	17	10	9				
Washington	1	1	1				
Georgia	2	1	1				
Texas	3	0	0				
Minnesota	3	3	3	36,246	26,466	62,712	61,964
Michigan	3	3	3				
Missouri	1	1	1				
Spiegel—All states						16,330	23,429
Ferro—All states						28,688	30,756
Totals	434	344	354	864,411	2,286,037	3,195,466	3,295,926

On Dec 1, 344 stacks were in blast. This is a net loss of 10, compared with the previous month. Five merchant stacks were blown in and six were blown out, a net loss of one. Steelmaking stacks showed a loss of nine, 13 having been blown out, while only four were relighted.

The merchant blast furnaces blown in last month were: One Grand River, Suawnee Iron Co.; Genesee, Corrigan, McKinney & Co.; LaFollette, LaFollette Coal & Iron Co.; Chattanooga, Chattanooga Iron & Coal Co., Nov. 15; and Graham, John B. Guernsey & Co., Nov. 17. The following merchant furnaces were blown out: One Iroquois, Miami Metals Co., Nov. 28; Troy, Buffalo Union Furnace Co., Nov. 8; Niagara "A", Donner Steel Co., Inc.; Globe, Globe Iron Co.; Union, Rogers, Brown Iron Co.; and Rockdale, J. J. Gray, Nov. 21.

MONTHLY PRODUCTION.

	1917.	1916.	1915.
Jan.	3,159,839	3,171,878	1,591,024
Feb.	2,649,935	3,078,548	1,666,592
Mar.	3,255,813	3,327,630	2,046,280
Apr.	3,319,809	3,225,496	2,114,518
May	3,413,677	3,364,584	2,255,157
June	3,260,234	3,213,818	2,369,932
Total 1st half	19,059,307	19,381,954	12,043,503
July	3,337,442	3,221,127	2,563,311
Aug.	3,238,970	3,197,838	2,774,825
Sep.	3,140,742	3,208,041	2,834,342
Oct.	3,295,926	3,508,180	3,120,340
Nov.	3,195,466	3,317,805	3,035,235
Total 11 mos.	35,267,853	35,834,945	26,371,556
Dec.	.....	3,184,178	3,201,605
Total 2d half	.....	19,637,169	17,529,658
Grand total	35,267,853	39,019,123	29,573,161

The steelworks or nonmerchant furnaces blown in in November were: Gary No. 2, Indiana Steel Co., Nov. 4; one Ashland, Ashland Iron & Mining Co., Nov. 12; one Donora, American Steel & Wire Co.; and Furnace "E", Bethlehem Steel Co. The steelworks furnaces blown out were: Bessemer No. 1, Tennessee Coal, Iron & Railroad Co., Nov. 15; one Central, American Steel & Wire Co.; two Ohio, one Bellaire, one Edgar Thomson, one Duquesne and one Isabella, Carnegie Steel Co. ;one Lorain, National Tube Co.; two Hubbard, Youngstown Sheet & Tube Co.; one Eliza, Jones & Laughlin Steel Co.; and Hall, Republic Iron & Steel Co., Nov. 26.

The Pioneer, Ala., blast furnaces Nos. 1 and 3 were shut down on Nov. 30 on account of a fire at the trestle.

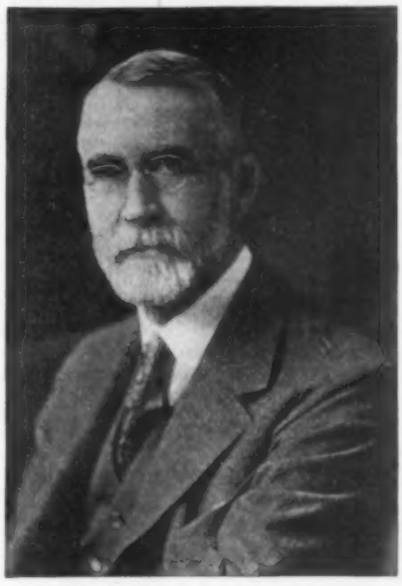
Engineers' Society Offers War Aid

The American Society of Mechanical Engineers Pledges Its Aid to Overcome the Threat to Civilization Embodied in the Perversion of Scientific Ability by Germany—Attendance Large

NEW YORK, Dec. 4. (By wire.)—Urging that American mechanical engineers concentrate on the great task of redeeming the scientific energies of Europe from malicious Prussian perversion, President Ira N. Hollis opened the first general session of the thirty-eighth annual meeting of the American Society of Mechanical Engineers in the Engineering Societies' building, Tuesday evening. Dr. Hollis pointed out that science wrongfully employed has threatened the entire world and that it is the duty of the engineering profession in particular to band together as a single unit to battle the peril confronting civilization. He stated that the engineer can no longer dwell within his technical shell, but must prepare himself to become a citizen of the world upon whose shoulders are placed great economic and social burdens. In dwelling on the particular need of bringing science rightly directed to combat that science perverted by the enemies of civilization, Dr. Hollis said:

"While it was not caused by the work of the engineer, this is essentially an engineer's war, in the respect that it uses all of his talent toward making the war more terrible. It is the culmination of the century of invention that followed Watt, and represents a struggle between those who have deliberately conspired to make use of all human resources and invention for securing dominion over the world, and those who believe that man advances in true happiness under individual freedom far better than under the direction of autocracy. It is our task as engineers to assist in making the world safe against the forces that we have unloosened, so that the century may not close with a total failure of the civilization of Christian races. It is we who have developed the applications of science, and it is we who are using it to destroy one another, forced into the struggle by the rulers of a nation that knows no right except might and no mercy except that which is taught them by the sword. Our great problem will be, not how to develop further, but how to tame what we have. Unless some conscience is aroused that science is not to be used against man, but for him, then it will never be safe for this world. It will always be an explosive ready to go off and destroy. The poisoning of wells is nothing beside the reversal of preventive medicine into a destructive agency. Every practical invention can be turned into evil for destroying the white races in favor of the yellow and black men who have no science.

"Our profession has been morally responsible for America under the century of invention just passed, as it



CHARLES T. MAIN

is we who have created the applications of energy and it is we who have given the wealth of the world into the possession of a few men. This war will create many millionaires. It will place vast power in the hands of the strongest and most ruthless. It will strengthen the trade unions into autocratic groups defining what each individual shall be permitted to do and what wages each shall receive. We must as engineers go forward with our own countrymen to kill this conspiracy against freedom and we must give our lives to fight, that science may never again be employed as a destructive agent in the hands of a few unscrupulous men."

New President Introduced

Following the opening address came the introduction of Charles T. Main, the president-elect, who was escorted by D. S. Jacobus and John A. Brashear, both past presidents of the society. Mr. Main's address supplemented that of Dr. Hollis.

Charles T. Main, the new president, has had a long and successful experience in the engineering field. He graduated from the Massachusetts Institute of Technology, from the department of mechanical engineering. He later served three years as an instructor at that institution. In 1879, he became an engineer for the Lower Pacific mills, Lawrence, Mass., and was advanced to assistant superintendent of the mills in March, 1886. In July of the same year he was made full superintendent. In 1890 Mr. Main gave up the administrative line for the engineering field, when he joined with F. W. Dean in Providence, R. I., forming the firm of Dean & Main, engaged in textile mill work. This firm gradually broadened its field to include all forms of industrial work. In 1907, the partnership was dissolved and Mr. Main has since continued in business under the firm name of Charles T. Main, his work being the designing of large textile mills, steam and water power plants.

The address of Ex-President William H. Taft was one of the leading features of the first session of the convention. Dr. Taft talked on the nation's call to the professional men, particularly doctors and engineers. In emphasizing the need of active professional aid, he pointed out England's deplorable situation, which resulted from the error of allowing her scientific men to go to the front early in the war.

A most interesting feature of the session was the conferring of an honorary membership on Major General George W. Goethals.

Takes Over Plant

Pittsburgh, Dec. 5.—After much hesitancy and against the wishes of its officers the Carnegie Steel Co. has acceded to urgent requests of the navy department to take over and operate the Alloy Steel Forging Co., Carnegie, Pa. This is the first instance known where government has taken over a plant for operation by itself or agents.

The new No. 2 blast furnace at the Gary, Ind., works of the Illinois Steel Co. was blown in on Nov. 4.

Will Place Huge Tonnage

Fabricated Steel Requirements for New Vessel Awards Will Exceed 432,000 Tons—More General Shape Demand in West

Philadelphia, Dec. 3.—About 182,000 tons of fabricated plates and shapes, of which some 72,000 tons will be shapes, are to be required for 70 8000-ton troopships which are to be built for the government by the American International Shipbuilding Corp. Bids on this steel are to be asked shortly. It is expected also that the Submarine Boat Corp. shortly will ask for figures on some 250,000 tons of fabricated plates and shapes for the 100 7500-ton freighters which it is to build for the government in addition to the 50 5000-ton freighters included in its first contract. The 432,000 tons to be called for, it is interesting to note, is sufficient to keep the entire fabricating capacity of the country engaged at the rate of 100 per cent for nearly 2½ months. Considering the fact that none of this work will go to the American Bridge Co., which is furnishing steel for the ships to be built for the Federal Shipbuilding Co., the Merchant Shipbuilding Corp., the Chester Shipbuilding Co., and the Newburgh Shipyards, it readily is apparent that it will form the backlog of the independent fabricators' schedules for some time. Demand for plain shapes is quiet and only small tonnages are wanted. Most of it comes from the warehouse interests and jobbers.

Private Business Lacking

Pittsburgh, Dec. 4.—Private consumers of fabricating material seem to be entirely out of the market. There is an almost total absence of inquiries. This is probably due to the fact that while some fabricators could accept tonnages of this kind, they report that it is impossible to get steel at the fixed price of 3c, Pittsburgh, except in connection with government requirements. Fabricators also are well booked and are not in a position to promise deliveries such as are generally desired by private consumers.

Commercial Work Absent

Cleveland, Dec. 4.—New business in structural material is exceedingly light and practically all work is related to government needs. As an example of the severe drop in general building work, a manufacturer of sanitary ware reports that his present demand is less than 10 per cent of his capacity. The 6000 tons of steel recently arranged for by crane builders to cover pending contracts for the latter is unplaced. An inquiry for 300 tons from a fabricator is current.

West Takes More Tonnage

Chicago, Dec. 4.—An unusual tonnage of structural material for new buildings was placed during the past few days in Chicago territory but only one lot is for purposes other than industrial. The Western Vaudeville association has placed 2000 tons with the Bethlehem Steel Co. for a theater building in Chicago. This order originally was for 3000 tons, but the design was changed to use reinforced concrete for the upper half of the building. Fabricating shops are receiving increased tonnages to be fabricated for the government's shipbuilding program, which is relieving the situation somewhat and is making up for the lack of private business.

Award Ship Steel to South

Birmingham, Ala., Dec. 4.—Announcement is made that steel will be fabricated in Birmingham for the Southern Shipbuilding Corp., Charleston, S. C., which has received a contract from the United States shipping board for 16 7500-deadweight tons steel cargo ships of the Whittelsey panel type. Three shops are to provide the fabricated tonnage. The Ingalls Works, recently incorporated, is to be one and probabilities are that two new plants would be built here at once.

CONTRACTS PLACED

State and Lake theater building, Chicago, for the Western Vaudeville Association, 2000 tons, to the Bethlehem Steel Co.

Renewal of inner 160 pockets, ore dock No. 3, for the Great Northern Railway Co., Allouez, Wis., 1138 tons, to the Ameerican Bridge Co.

Extension to present plant, for Columbia Steel Co., Pittsburgh, Cal., 250 tons, to the Pacific Rolling Mill Co.

Structural steel for new rigger shed, for the Utah Copper Co., Magna, Utah, 175 tons, to the Kansas City Structural Steel Co.

Bridges for Chesapeake & Ohio, 250 tons to independent fabricators.

Seven buildings for American International Shipbuilding Corp., Philadelphia, 470 tons, to Belmont Iron Works. One building, 480 tons, to Levering & Garrigues.

Warehouse and airplane depot for government, at New York, 700 tons, to Austin Co.

CONTRACTS PENDING

Crane runway for Washington navy yard, 950 tons, bids being taken.

Extension to building No. 105, Washington navy yard, revised bids being taken.

Government nitrating plant at Sheffield, Ala., 6000 to 7000 tons, bids being asked on a portion of this tonnage.

Russian Contracts

For Cars and Locomotives to be Filled —Union Pacific Buys

New York, Dec. 4.—Nothing yet has been done to halt construction of any of the cars or locomotives recently ordered in this country by Russia. It is expected that all Russian railway equipment contracts will be completed. The 1500 locomotives which a few weeks ago were about to be placed, however, still are held up.

The director general of railways at Washington has placed with the Cambria Steel Co. another order for 5000 50-pound rails for use in this country. Small lots of standard open-hearth rails, up to 300 to 400 tons, are being booked by a leading eastern maker at $85 to $90, mill.

The Chilean State railways are in the market for about 1200 cars. This inquiry is to be split up into four or five different classifications. The Utah Copper Co. wants 200 oil cars; the Lehigh Portland Cement Co., 50 hoppers, and the Anaconda Copper Mining Co., 10 box cars. The Illinois Central railroad has ordered 25 switching locomotives from the American Locomotive Co. and 50 locomotives from the Lima Locomotive Works. The Philadelphia & Reading railroad has decided to build 10 freight and five passenger locomotives at its Reading, Pa., shops.

The Baldwin Locomotive Works, which recently broke all previous records by turning out 78 locomotives a week,, has eclipsed this performance by turning out 100 locomotives per week.

Rail Demand is Light

Pittsburgh, Dec. 4.—Inquiries for light rails are coming to makers the price of which has been established at 3c per pound, Pittsburgh, and limited tonnages are reported to have been sold on this basis. Makers of standard rails are out of the market.

Union Pacific Buys Cars

Chicago, Dec. 4.—Practically the only feature in the freight car market during the past week is the placing of 4500 cars by the Union Pacific railroad. Mention was made last week of 1000 hoppers being taken by the Pullman Co. and in addition this road has placed 1000 stock cars with the American Car & Foundry Co., 1000 gondolas with the Cambria

Steel Co. and 500 flat cars with the Bettendorf Co. Armour & Co. will build 500 refrigerator cars in their own shops.

Definite Prices

On Cast Iron Pipe Expected to be Fixed Soon—Tonnage Diverted

New York, Dec. 4.—Cast-iron pipe makers have held several additional meetings during the past week to agree upon prices to be recommended for announcement by the American Iron and Steel institute. It is expected that a definite decision will be made no later than this week. In the meantime, the market continues to be quoted at around $54.50, New York, for 6-inch, Class B, and $57.50 for 4-inch, Class B, although some makers continue to quote a little higher. The biggest public letting to come up for some time is by Jersey City, N. J., Dec. 12. This calls for 5500 feet of 20-inch, 2000 feet of 12-inch, 1000 feet of 10-inch, 8000 feet of 8-inch, 1000 feet of 6-inch, 500 feet of 4-inch and 200 feet of 24-inch.

Taking Tube Business

Philadelphia, Dec. 3.—A leading eastern mill is in a position to book extensive tonnages of lap welded steel boiler tubes for delivery over the first half of 1918.

Steel Tonnages Diverted

Pittsburgh, Dec. 4.—Owing to the embargo against the shipment of iron and steel products for export, tonnages of steel pipe which have been diverted to domestic consumers have involved some fairly large tonnages. Mills are filled up with orders and are unable to take new business except in instances where light tonnages are wanted by regular customers. Demand for lap weld iron pipe continues to be strong and although mills making this grade are from two to three months behind on deliveries, they are taking some new business.

Cast Pipe Quiet

Chicago, Dec. 4.—Little business is being offered in cast iron pipe, the expectation of an agreed price possibly having some effect in this direction. The season is another factor that is restricting buying and the present price is higher than most cities can afford to pay. New bids have been asked by Wooster, O., on 370 to 500 tons which will be opened Dec. 20. Opening of bids on 4500 tons of 48-inch pipe at Winnipeg has been delayed until Dec. 14.

Sheet Allotments Heavy

Government and Allies Continue to Distribute Sizable Tonnages Shortage Next Year is Feared—Further Contracts Taken

Youngstown, O., Dec. 5.—Exceptionally large tonnages of sheets are being rolled by the valley mills for the government and the allies. These requirements chiefly are for black and blue annealed sheets of various gages and specifications. Recent allotments for blue annealed sheets which have been made by the government among the mills in this territory, range from 200 to 1000 tons each. In all cases the priority system was used. Some of the manufacturers still are turning out sheets for export purposes largely for Italy and France, although the tonnages are relatively small. Most of the galvanized sheetmakers in the Mahoning valley have withdrawn from the market. Inquiry from the domestic trade for black and blue annealed sheets is very heavy and in most cases greater than the mills can fill. Consequently innumerable tonnages are unsatisfied. However, at times material can be had for immediate delivery. For instance, some time ago a western contractor bought a blue annealed tonnage from a valley maker. The material was to go forward this week, but since the contractor was not ready for it he inquired whether he could resell the sheets. The producer obliged him by cancelling the contract and placed the tonnage elsewhere. When odd lots of sheet bars are offered a certain producer or can be purchased when the mill has an open schedule, sheets are being offered to the domestic trade. This probably accounts for current reports that one valley producer is soliciting orders.

Shortage is Probable

Pittsburgh, Dec. 4.—Indications are that production of sheets next year will be short and insufficient to meet domestic requirements. Mills have been booking large tonnages for the government and are allotting requirements for their regular customers. Contracts for black and blue annealed sheets are being taken for first half delivery, while those for galvanized sheets are for first quarter delivery. Producers are restricting sales to consumers who are engaged in essential lines of manufacture. The shortage of steel, it is feared, will appreciably curtail the output of sheets.

Ask Premium for Export

Chicago, Dec. 4.—Unusual demand for all classes of steel sheets for export is appearing in this market. On such tonnages, where it is possible to give a place on mill books, makers are asking a premium of $10 per ton over the fixed price. The leading independent is sold up on its production for first quarter and is not able to take further business for domestic or export users. This interest some time ago notified all its regular customers to send in specifications for all requirements through the first quarter and the remainder of its production then was allotted to other buyers, principally export. Apparently most sheet makers are in much the same position as those represented in this market, as demand from export buyers continues unabated and it is difficult for the latter to place their requirements.

Wire Sales

For First Quarter Were Restricted—Expect Easier Market Later

Pittsburgh, Dec. 4.—Relatively small tonnages of wire and wire products have been sold by mills in this district during the past week to regular customers for first quarter delivery. Mills are cautious about committing themselves for large requirements, partly because of the apprehension that output may have to be curtailed by reason of the shortage of steel. Some small orders also have been taken for prompt delivery which can be made in the case of small sizes of wire. Manufacturers' wire is now being quoted at $3.35. The government is placing fairly large orders for nails. Orders for wire rods also have been taken, but the demand for them has lessened. It is not believed that demands coming to wire mills for 1918 will be so heavy after the next four or five months as they have been during the current year, due to the British who have become self-supporting.

Quote Pittsburgh Base

Cleveland, Dec. 4.—Considerable selling of manufacturing wire for first quarter continues in this district. Some mills are quoting this grade strictly at $4.35 per 100 pounds, Pittsburgh, or $4.48½, Cleveland, and are not making the 5 cents freight allowance to Cleveland territory which the leading maker has been accustomed to do.

Breaks Record

November Ore Shipments are Heaviest For That Month—Season's Total

The largest November ore shipments on record were sent down from upper lake ports during the past month. These amounted to 7,333,828 tons, an increase of 1,618,376 tons over the shipments of November, 1916. The season's tonnage from upper lake ports has been consistently running behind that of 1916 up to this time. At the end of October, the 1917 shipments were 3,679,248 tons less than those of corresponding months in 1916. The unprecedentedly large tonnage for November has cut this figure to 2,060,872 tons. Total shipments up to December were 61,587,426 tons.

The November shipments by ports were as follows:

ORE SHIPMENTS FROM UPPER LAKE PORTS

Port	Nov., 1917	To Dec. 1, 1917
Escanaba	838,096	7,000,870
Marquette	327,113	3,197,213
Ashland	900,241	7,503,479
Superior	1,516,162	13,769,433
Duluth	2,583,620	20,270,617
Two Harbors	1,168,596	9,845,814
Totals	7,333,828	61,587,426

Export Shipments

Further Placed Under Government Control by Regulation of Traffic

New York, Dec. 4.—Eastern railroads, acting for the government, have notified shippers that no more plates, bars, billets, pig iron and scrap will be accepted for export unless consigned to the United States government. The committee in issuing this order said that there are now 1,325,000 tons of iron and steel waiting overseas transportation. Another order resulted in diverting all through freight which ordinarily passes through the Pittsburgh gateway to lines north and south of the Pittsburgh district. A third order discontinues the Pennsylvania-Broadway, Ltd., the fourth order suspends the operation of fast freight lines on full tonnage continuous movement schedule, and the fifth provides for only box and stock cars for team track loading of coal.

The fuel administration at Washington has asked coal operators to give preference for the next 30 days to the orders of consumers engaged in producing essential manufactures.

Will Add Ovens

The Wilputte Coke Oven Corp., 6 Church street, New York City, has been awarded a contract for the installation of 25 Wilputte regenerative by-product coke ovens, with certain by-product equipment, as an extension to the present coke oven plant of the Algoma Steel Corp., Ltd., at Sault Ste. Marie, Ont. Work will be started immediately, and the construction is expected to be completed by July 1, 1918.

Corporation Capacity

In Large Part Going to Government Needs—Expending Huge Sum

New York, Dec. 5. (By wire.)—About 80 per cent of present capacity of the Steel corporation, it is officially estimated, is being devoted to government military requirements and at least 75 per cent of the total amount of steel being purchased by the government is being furnished by the Corporation. The extent to which the Steel corporation is equipping for government work is illustrated by the fact that at the government's request it is increasing the shell forging capacity of the Illinois Steel Co., the Carnegie Steel Co. and the National Co., at an expenditure of about $7,000,000.

The Federal Shipbuilding Corp., the Steel corporation shipbuilding unit, which two weeks ago laid its first keel, yesterday laid 50 keels, and by May expects to be turning out one ship every 10 days.

Coke to be Diverted

New York, Dec. 5. (By wire.)—The government is requesting coke from by-product plants be sent to large public utility properties so they can continue operations, and it is believed this eventually will affect pig iron output seriously.

The Steel corporation is constructing an enormous plant at Gary for government work exclusively. Large orders from the government continue to be distributed. Yesterday about 150,000 tons were placed.

Wants Much Pipe

Pittsburgh, Dec. 5. (By wire.)—The Philadelphia Co. has put out inquiries for approximately 375 miles of lap-weld steel pipe comprising about 20,000 tons. While most makers are reported to be unable to quote on this heavy tonnage owing to commitments, it is believed that the contract will be placed next week.

The Non-Ferrous Metals

Copper Lead Spelter Tin

New York, Dec. 4.—Seizure by the government of all the tin analyzing 99¾ per cent or higher in bonded warehouse in New York last week emphasized the shortage of tin in this country, as most of this tin was owned by consumers. The navy department requisitioned this metal for use in navy yards. However, the supreme control of tin distribution in this country had only recently been vested by the government in the American Iron and Steel institute subcommittee on tin and this action apparently was a conflict of authority. At any rate, John Hughes, assistant to the president of the United States Steel Corp., and chairman of the tin committee, protested to the department of commerce, whereupon promises were made to release a large proportion of the tin seized. The probable result of the incident will be to hasten the negotiations of our government with the London rubber and tin exports committee, which has been holding up about 3500 tons of tin purchased by American interests. Straits tin has sold this week at 85c, New York, a price far exceeding any price recorded in 50 years, Chinese No. 1 and other 99 per cent grades of tin which cannot be utilized for food containers because of arsenical content and other impurities, has also been in good demand, selling up to 71.50c this week. Spot Banca tin is quoted 85c, New York.

The copper market gradually is being straightened out. The price on carload lots is 23.50c, as fixed by the government and 24.67½c on less than carload lots, as provided by an arrangement recently made by the copper producers' committee with the war industries board. Production is gradually increasing and prospects are that by early in 1918 it will be sufficient to meet the general commercial demand. Some copper already is being distributed to consumers which are not working on government orders.

The antimony market has shown increasing activity this week after utter lethargy for many months. Following small purchases by the Bethlehem Steel Co. a week ago, at 13.75c, duty paid, the trade has reported an increased number of inquiries and a fair volume of selling. Sales were made today at 15c, while holders advanced their asking prices to 15.50c, for spot.

The lead market has been quiet and slightly easier. Spot in the east has sold at 6.62½c, New York, by outside sellers, as compared with the leading interest's quotation of 6.25c, New York. For prompt and December shipment, 6.37½c to 6.45c, St. Louis, is quoted in the outside market.

The spelter market has been inactive, with no news from Washington concerning the progress of the price fixing program. Prime western spelter is quoted 7.75c for prompt and December shipment; 8c to 8.26c for first quarter shipment.

How Cold Rolling Machines Are Made

Their Design and General Application

Demands of Automobile, Art Metal and Metal Furniture Manufacturers for More Efficient Forming Equipment for Light Sheets Has Led to the Development of These Mechanical Units

NO SUBDIVISION of the iron and steel industry can boast a more remarkable or swifter development than the hot rolling mill. A struggling infant at the end of the third quarter of the 19th century, it has entered upon an era where the necessities of industrial life are dependent on its daily output of finished products. Without it, unless the inventive genius of a nation once again would come to the rescue, the existence of our gigantic railway system would be almost impossible; likewise that of our huge steel battleships and merchantmen, enormous skyscrapers, telephone and telegraph systems, bridges and countless other types of construction. But the hot rolling mill is a reality. It will continue to convert slabs into plates and blooms into rails. As the curtains of the future gradually unfold themselves they will, undoubtedly, reveal newer and broader fields for this unit. The hot rolling mill long has monopolized space in technical journals. Its attributes and virtues have been expounded and criticized. Cold rolling, however, has not come in for so much attention, although it has before it a large field especially in the rolling of light-gage sheets.

The general subject of cold rolling or cold working, as it is generally understood, is straining cold metal slightly beyond its elastic limit. Depending upon its nature and upon its further use and treatment, it may be beneficial or harmful. Cold working may consist in reducing, to a small extent, the cross sectional area of the material by rolling, hammering or drawing; distorting by bending or twisting and finally by punching and shearing. The effect of any of these operations is to deform the metal from its original crystalline structure, which, because of its rigidity when cold, can only be regained by annealing.

The operations of rolling, hammering, punching and shearing have long been employed, but it was probably not until the automobile industry was well under development, and until factories for manufacturing steel sash, metal furniture and art work began to spring up that the necessity for rolling light gage sheets on new types of machinery manifested itself. Previously, operations of this character invariably were performed on stamping and forming machines.

In 1909, when the automobile industry was beginning, in actual production of machines to indicate the proportions which it ultimately reached, the Yoder Co., Cleveland, was incorporated with the primary object of making machines to roll mud guards. These machines were the invention of Carl M. Yoder, president of the Yoder company, who has, since their initial appearance on the market, developed and produced a wide variety of punching, shearing and forming equipment and several variations of the original cold rolling machine.

The machines shown in Figs. 1 and 2 are in principle much the same as the original ones made in 1909. They are capable of producing any kind of fenders, but are designed especially for rolling crown fenders for the new

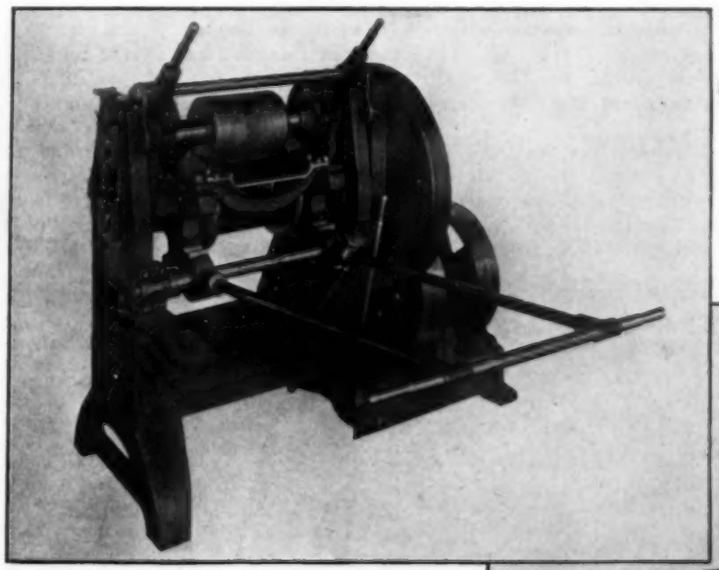


FIG. 1—FENDER FORMING MACHINE SHOWING ROCKER BAR, ECCENTRIC AND LEVER FOR LOCKING LATTER

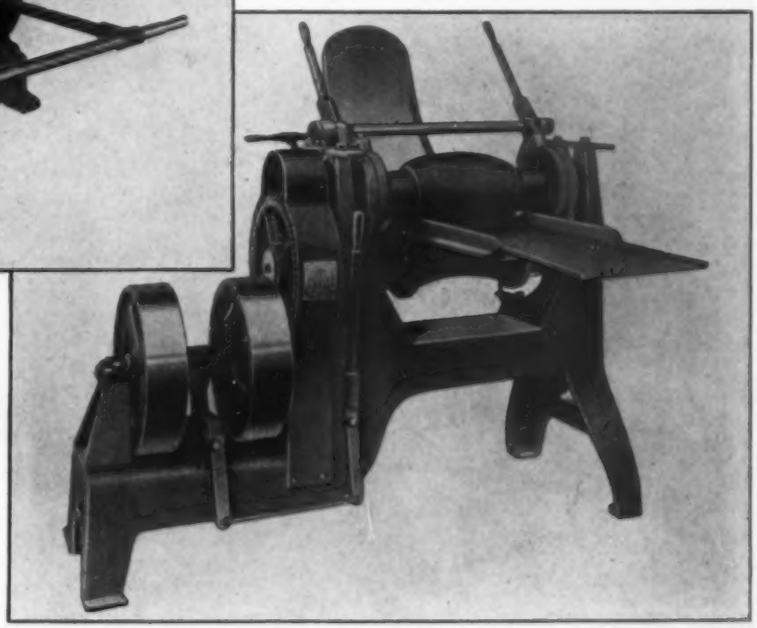


FIG. 2—OPPOSITE VIEW OF MACHINE OF SIMILAR DESIGN WITH CLUTCH REVERSING MECHANISM IN POSITION

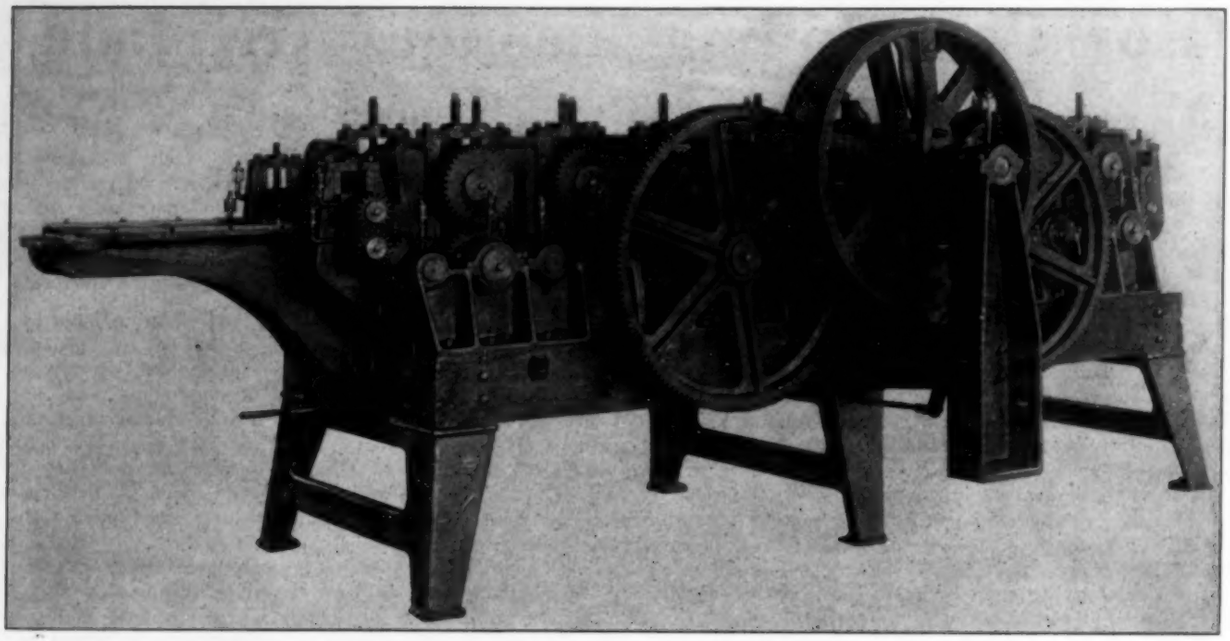


FIG. 3—OLD TYPE OF COLD ROLLING MACHINE

army liberty trucks. They are friction clutch reversing and will produce a finished fender from a flat strip of metal in from 30 seconds to 3 minutes, according to the gage of the material under fabrication. The fender is formed through the medium of a rocker bar, shown in Fig. 1. This bar is mounted on a shaft and geared up with an adjustably mounted shoe on which is bolted a bronze forming plate. The top roll is raised and lowered by an eccentric, shown in both figures. When in the lowest position, that is when the roll is acting on the work, the eccentric is locked in position. When raising the eccentric the lock, which is operated by a lever, is easily pulled out by hand. The eccentric is equipped with set screws to provide necessary adjustment for the wear of the roll. The roll is rigidly keyed on the shaft. Safety guards cover the large spur driving gear.

The machine requires two men for operation. One feeds the metal into the rolls, carries away the finished product and operates the reversing clutch. The second man, generally in charge of the machine, superintends the rolling of the material. He operates the rocker bar and the eccentric and directs his helper in reversing the machine.

The most important and intricate machine manufactured by the company is, however, the one shown in Figs. 3, 4, 5 and 6. Its period of development covers the major portion of the past seven years. It is possible to roll on it almost any conceivable practical sheet metal shape. Its foundation or bed plate is a two-ton gray iron casting with a planed surface.

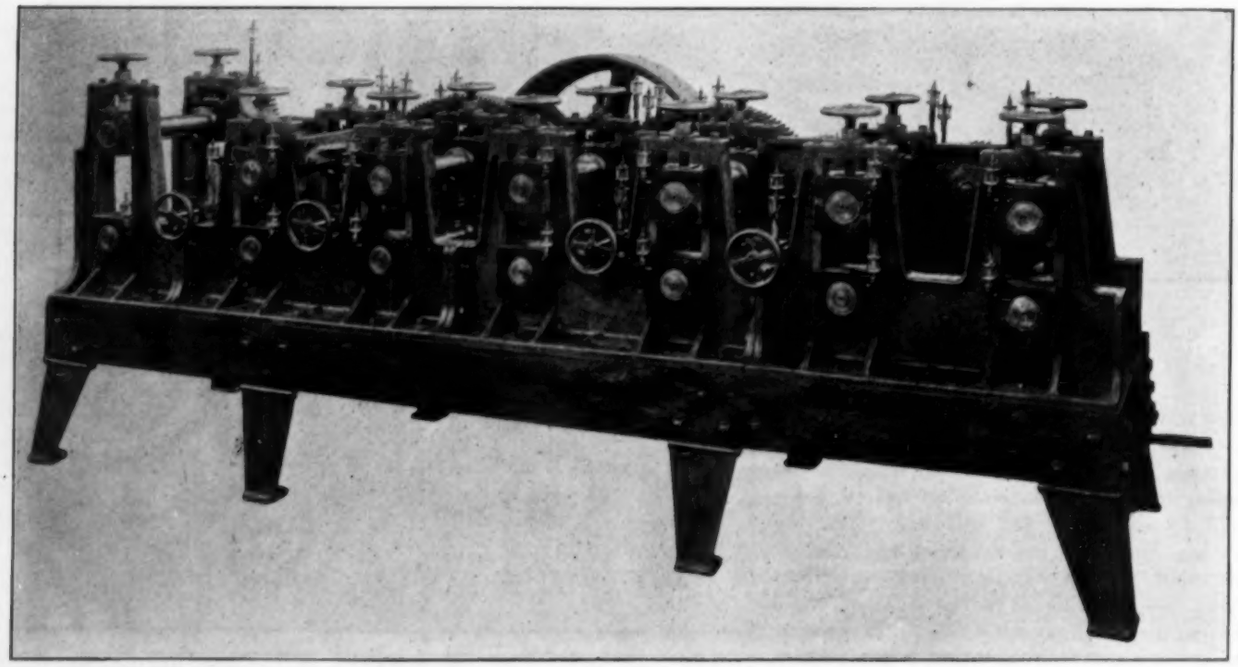


FIG. 4—SIDE VIEW SHOWING HOUSINGS, SHAFTS IN POSITION AND HANDWHEELS

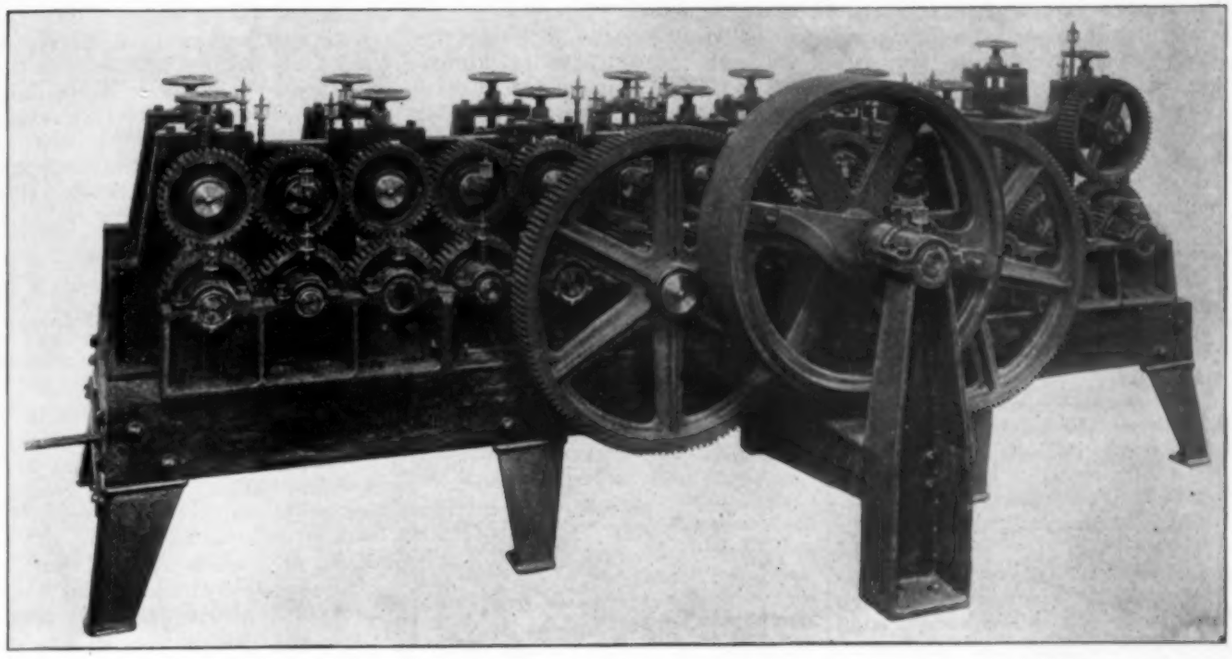


FIG. 5—BROADSIDE OF LATEST TYPE OF MACHINE, SHOWING ARRANGEMENT OF GEARS

The housings, which are bolted on either side of the bed plate, are likewise single castings. Starting with the bed plate and housings and building up the entire forming equipment in the finished product, the installation of two bearing boxes, one for each shaft, into each individual housing section is the first step. Bronze bushings are employed in the bearing boxes exclusively. Next the shafts are fitted into the bearings and the individual spur gears fitted onto the shaft ends. As in the crown fender forming machine, the rolls are rigidly keyed onto the shafts. The shafts are 3½ inches in diameter by 36 inches long, the diameter of the shafts being the same throughout their entire lengths. This is for a particular purpose which will be explained further in the description. The shafts are keyed the entire length of the rolls and are also encircled by collars to hold the rolls tightly in position.

Fig. 7 shows the principle of rolling. The flat strips are drawn into the machine by means of the feeding rolls to the first forming rolls. This pair of rolls converts the metal to its own shape, and, the latter continuing in its course meets and passes the second roll where the second operation is effected. Thus when the metal has passed through the sixth and last pair of rolls it emerges as the finished product.

A unique feature of the machine is that, unless unusually wide strips must be operated on, it can be converted into a double rolling machine. As stated above, the shafts are of the same diameter their entire length, which arrangement permits the entire outer housing with its bearings to be slid over until almost touching the rolls and rebolted to the bed plate. The collars are, of course, slipped off the shafts to do this. When the housing

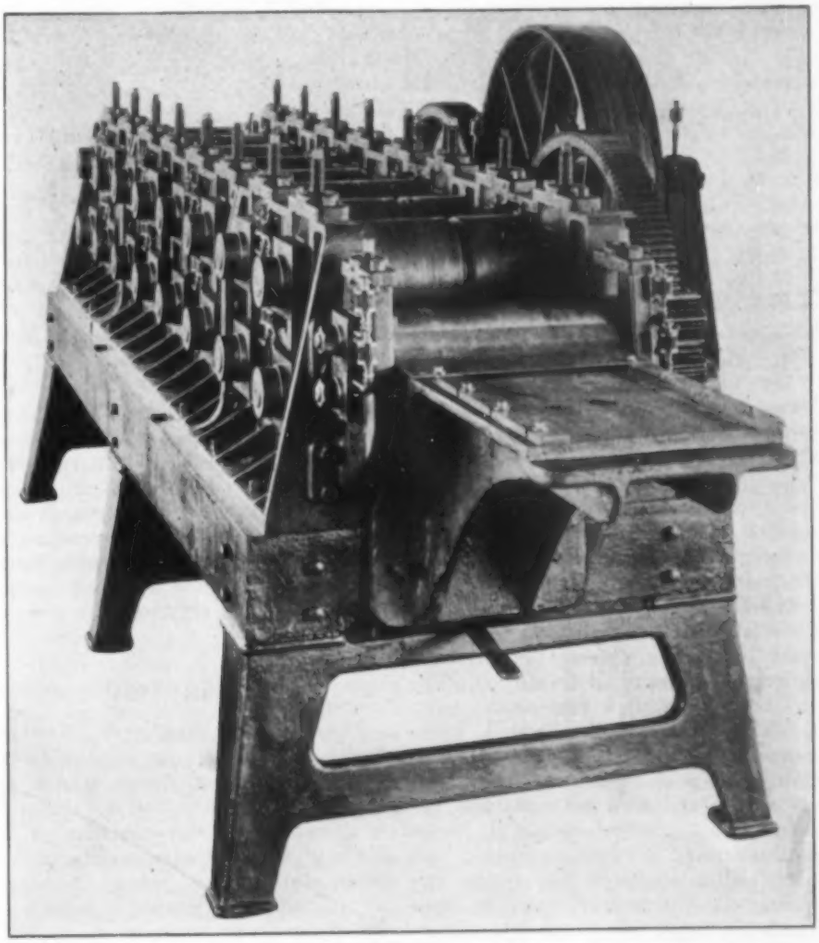


FIG. 6—END VIEW OF MACHINE SHOWN IN FIG. 5

has reached its new position a length of each shaft naturally projects a considerable distance beyond the outer housing. On these shaft ends is placed a second set of rolls.

When the machine is converted into a double rolling machine it is not meant to imply that strips can be fed into each set of rolls simultaneously. The object of the two sets is to permit one work job to be run through on one set of rolls and then, without tearing the machine down in any way or adding new equipment, complete a second job on the remaining set of rolls.

The machine shown in Fig. 5 is belt-driven, the mechanism being set into motion through a friction pulley. The friction clutch is controlled by means of a hand lever shown at the head of the machine. On the end of the shaft holding the friction pulley is a pinion which drives large spur gears. The latter drive the idler gears, which in turn drive the individual gears that turn the rolls. The machine was constructed for the Elyria Iron & Steel Co., Cleveland, and is slightly different in principle from any constructed heretofore. The gears on the upper row of the shaft on the housing mesh together, as do also the gears on the lower shaft. Thus each set of gears is independently driven and each set maintains the same speed. In the previous machines manufactured by the company, one of which is shown in Fig. 3, only the lower set of gears, which meshed with the upper set, being driven.

The rolls may be raised and lowered in the housings by means of individual hand wheels. It is said that the rolls are capable of handling 100,000 feet of material before standing in need of redressing. Bearings are oiled by sight feed oilers, shown most distinctly in Fig. 4. Material of No. 11 gage is said to maintain a constant speed of from 60 to 70 feet per minute, through the machine when the latter is maintained in constant operation.

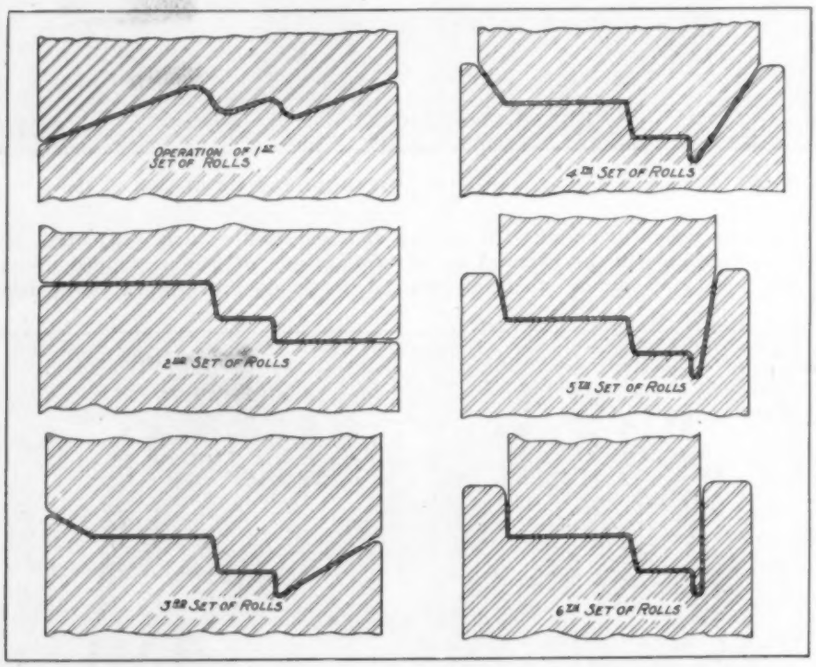


FIG. 7—CHART SHOWING PROGRESSIVE SHAPING OF METAL THROUGH ROLLS

Exhibits New Furnace

The Ajax Metal Co., Philadelphia, after experimenting for five years has developed the Ajax-Hyatt electric furnace to melt nonferrous metals exclusively. It is of the induction type and eliminates the use of crucibles. J. H. Clamer, vice president of the company, exhibited this furnace and explained its design and operation at the meeting of the Philadelphia Foundrymen's association at the Manufacturers' club, that city, recently.

Women in Industry

The Associated Employers of Indianapolis are sending out questionaire to determine to what extent women are being employed in industry. The work is being done at the suggestion of the National Metal Trades association and other similar organizations. A survey of all the larger industrial centers of the country will be made.

Questions are asked covering the number of women employed, their ratio to the total working force, the kind of work they do and their comparative efficiency. The employer is also asked to state whether he intends to engage more women. In addition data are requested concerning the comparative wages of male and female labor.

Book Review

Shape Book, issued by the Carnegie Steel Co.; leather; 352 pages; 5 x 7½ inches; furnished by the Carnegie Steel Co., Pittsburgh, for $1.00.

A new shape book has been issued by the Carnegie Steel Co., Pittsburgh. In this, the sixth edition, many additions are noticeable when a comparison with the preceding edition is made. Unmistakable signs of the effects of shipbuilding and other recently augmented requirements are in evidence. Chief among the additions made are those relative to bulb angles for shipbuilding rolled to conform with British standard specifications. These are special shapes. A second addition embodies four special shapes specially designed for car-building work. Another new feature is comprised in the addition of shapes rolled for use specially in the construction of Braddock insulated rail joints. New tees now being rolled include those for plows, window sash and scraper tires. The effect of the automobile on the rolling mill industry is seen in new wire wheel sections, clutch pawl sections and others. More agricultural beams also are being rolled than formerly. New sash and casement sections, which have been developed by the requirements of various builders of window sash and similar building equipment also are given.

The sixth edition supersedes all previous editions and contains data pertaining to practically all sections rolled by the mills of the Carnegie Steel Co. All profile dimensions are theoretical, as heretofore, the profile applying to the minimum weight of section in case several weights of sections of that type are rolled. The profiles of British standard bulb angles show correct dimensions of that standard at the thickness given. No changes have been made in the tables appended except to make additions to cover the new shapes brought out. As heretofore the weights of flat rolled steel, round and square bars beveled edge and over bars, expressed in pounds per lineal foot are given. Tables of United States standard gage for sheet and plate iron and steel, as well as that of decimal equivalents are appended.

Meet Airplane Tool Needs Readily

Machine Tool Builders Easily Absorb Business Occasioned by Airplane and Motor Construction—Cancellations by Automobile Makers Ease Market—Buying Crest in Equipment for First Airplane Fleet is Past

BUILDING the 20,000 airplanes provided for in the $640,000,000 aviation bill passed by congress last July, is a herculean task and many industries are undergoing a stimulation occasioned by the expenditure of this vast sum of money. While no intention is expressed to minimize the far reaching effect of unloosing this fleet of bombing and fighting machines upon the enemy, it is asserted by many that altogether too much stress has been laid upon the supposed effect of the expenditure of this money upon our various industries. In particular, the machine tool industry has been little influenced by inquiries from makers of airplane motors, as these inquiries, for the most part, have been for machines which have been available within comparatively reasonable delivery periods. Although machine tools have been given priority certificates bearing the A-1 rating few conflicts with other priority certificates have been observed, at least within the range of vision of several representative men of the industry. This it would seem bears out the correctness of the foregoing statement. The building of 15,000 airplanes and their motors in this country undoubtedly is being felt to an appreciable extent in the making of small metal parts, jigs, dies, textile of a special kind, and the lumber, metal and machine tool industries, but thus far although many machine tools have been bought, the building of airplane motors and principally airplanes, have been without a decided effect upon that industry.

Few Machine Tools Required

In no way can the existing shortage in machine tools be attributed to the demands of the airplane motor and airplane industries. In the first place, few machine tools are required in the construction of airplanes, as nothing but ordinary tool room equipment for the most part is necessitated. The machines required for airplane production consist essentially of woodworking machinery such as band saws, variety saws, planers, jointers, shapers and the like. On the other hand, there are required for the production of airplane motors multiple spindle drills, automatic lathes, grinders, turret lathes, gear cutters, milling machine and equipment of a similar nature. In general, the woodworking machinery needed for this work has been almost immediately available while machine tools, as asserted before, have in no way materially deferred the beginning of work on airplane motors. Undeniably an extreme situation exists in the shortage of machine tools for heavy boring planing and milling operations, but it must be understood that these machines are not used in the production of airplane motors. Evidence that the buying of equipment for plants now engaged in building airplane motors has been accomplished without undue difficulty and that the machine tool industry readily has assimilated that volume of business is shown in the following case: When the J. G. White Engineering Corp., Boston, summoned representatives of the leading machine tool builders of the United States to gather in Boston last September to submit proposals for supplying tools, for the government's liberty motor plant in France, contracts for approximately 1000 machine tools having a valuation of $3,000,000 were closed. At that time it was thought that deliveries on many types of tools including even smaller sizes of boring mills, milling machines and grinders would be pushed far ahead. The situation two months after the signing of these contracts, is not materially different than it was at that time, and it would seem from present indications that the deliveries on small tools at least are better now, than then. if anything. Data secured from a reliable company shows that deliveries are nowise worse than two months ago. Deliveries on large cylinderical grinders for example, are promised in from 60 to 90 days—not materially different than those of two months ago; deliveries on milling machinecs have remained practically stationary, being promised in from 6 to 12 months, the same as two months ago, while deliveries on horizontal and vertical boring mills have remained at from 8 to 12 months, without change.

Rearrangements of existing manufacturing facilities and readjustments made necessary by the war, are drawing a large share of airplane motor business into these channels, thus renderinng possible the carrying on of production without an extensive outlay for new equipment. These are minimizing the effect of the airplane industry upon the machine tool industry. The pleasure car production of the United States as an example is being greatly curtailed. This is evidenced in the government's action in discouraging the diversion of certain materials into that field rather than into the production of war materials. As a result the activities of automobile makers have been hampered, and many now are welcoming the opportunity to branch off into the production of truck motors and airplane motors. Some time ago the aircraft production board evolved a plan to enable makers of automobiles to carry on the production of airplane parts and motors in lieu of their usual volume of peace-time work and today several makers who were awarded contracts now are actively engaged in making airplane parts, accessories and motors. Prominent among the companies now doing work of this kind are: The Buick Motor Co., Flint, Mich., which has been awarded a large contract to produce LeRhone motors, and the General Vehicle Co., Long Island City, which is to construct Gnome rotary motors. The following companies are typical of those to make liberty motors or liberty motor parts: The Trego Motors Corp, New Haven, Conn.; The Ford Motor Co., Detroit; the Nordyke & Marmon Co., Indianapolis, and the Hall-Scott Motor Car Co., Oakland, Cal. The contracts awarded to the foregoing companies as well as those held by the Westinghouse Air Brake Co., Wilmerding, Pa., The Standard Aircraft Corp., Plainfield and Elizabeth, N. J., and others have been productive of inquiries for equipment. But the majority of these companies had been engaged in work of a similar nature previously and did not require initial equipment, but supplementary equipment.

Cancellations Ease Market

Cancellations of contracts by automobile makers also have played an important part in lessening the effect of the airplane upon the machine tool industry. virtually the apparent case with which the demand for tools from the airplane industry have been supplied consists in the fact that the production of automobile and airplane motors are closely allied, except for the special design, greater accuracy in making parts and the more careful assembly required in the case of the latter, and that owing to the adaptability of machine tools either to the manufacture of motor parts for automobile or airplane motors, tools may be interchanged.

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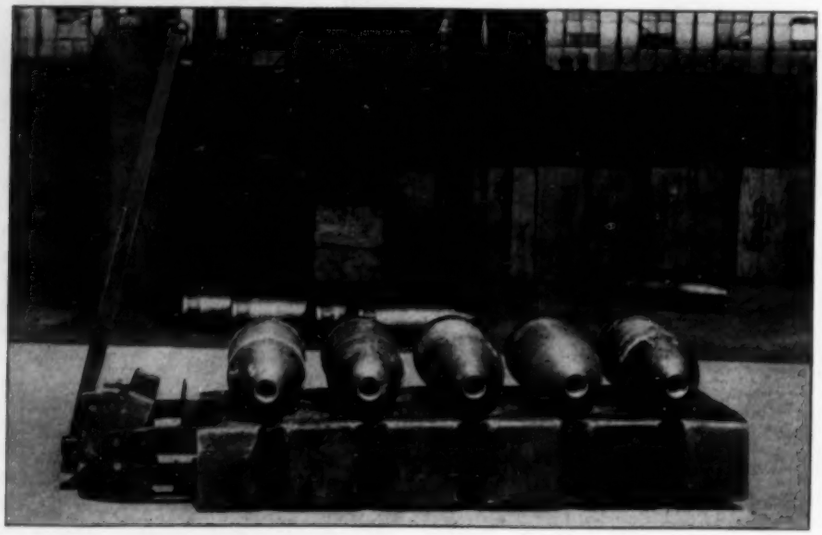


STEEL TRUCK PLATFORM OF ONE-TON CAPACITY

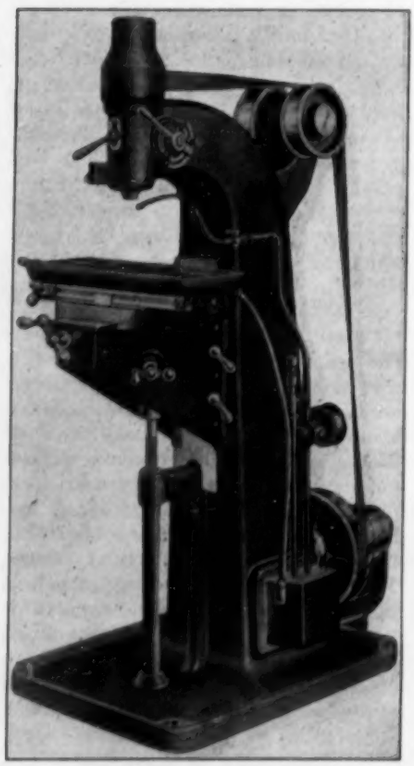
Truck Platform Embodies Novel Features

A pressed steel platform for use with hand or power elevating trucks is being made by the McMyler Interstate Co., Cleveland. These platforms are designed to meet the requirements for a rigid, portable platform without excessive weight, for use in the operation of a hand or power elevating truck system. Because of the grooves or ribs which are pressed into the single steel plate used to make the platform, great rigidity and strength are effected. All platforms are shaped in a one thousand-ton capacity press and are said to be capable of handling one-ton loads without danger of failure. Standard size units are made with inside clearance heights varying from 5½ to 10¾ inches; inside clearance widths from 23½ to 39½ inches; and standard lengths from 24 to 78 inches.

Markets Vertical Milling Machine

A new light vertical spindle milling machine which now is being marketed by the Taylor & Fenn Co., Hartford, Conn., has many features. The machine is designed not only to be sufficiently rigid and powerful to permit of high cutter speeds, but also to be used for light profiling. The machine is said to be particularly adapted for manufacturing light interchangeable parts. It is fitted throughout with double-row, self-aligning ball bearings. In its construction the unit system is strictly adhered to; individual parts being assembled in groups. All rotating parts are ground and sliding surfaces scraped. The spindle is mounted in a steel sleeve fixed to the head. The vertical movement of the spindle, which is 2 inches, is controlled by a small hand lever conveniently located. This lever is locked in position by a clamp ring and handle attached to the front of the head. Positive stops are provided for controlling the longitudinal and cross movements of the table. Eight spindle speeds, ranging from 246 to 4000 revolutions per minute, are obtained by means of a 4-step cone pulley and a 2-speed friction countershaft.

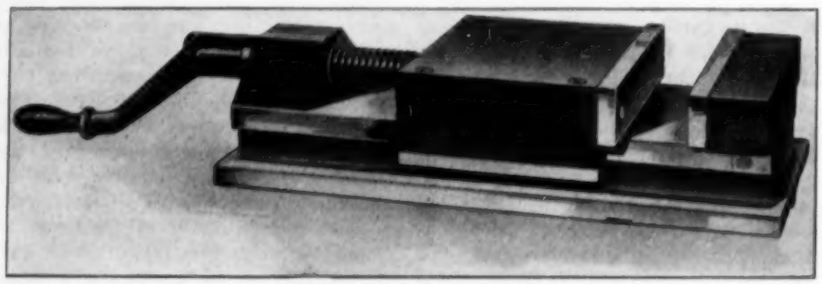
The milling capacity of the machine is such, that a longitudinal movement of 11 inches, a cross movement of 6 inches and a vertical movement of 9½ inches is available. The hollow tool-steel spindle has an outside diameter of 2 inches, an internal diameter of 13/32 inch, and the tapered end conforms to the No. 7 Brown & Sharpe standard. Table dimensions are 9 x 21 inches and the working surface is 6 x 18 inches. A T-slot ⅝ inch wide is provided. Maximum clearances of 11½ inches between spindle end and table, and 10 inches between spindle center and column, are given.



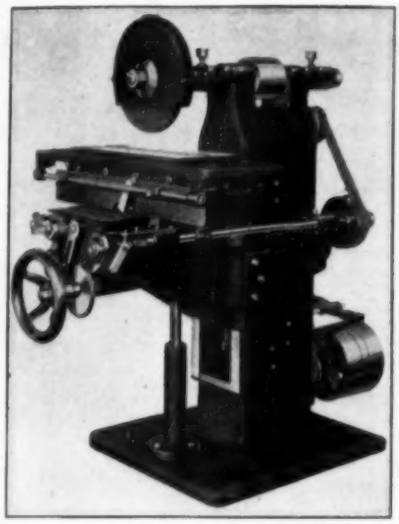
VERTICAL MILLING MACHINE

Manufactures New Vise for Milling Machines

In a plain vise made by the Cleveland Milling Machine Co., Cleveland, some novel features have been incorporated. Because milling machine vises often are used in place of a jig or fixture and occasionally are used in pairs, so that one vise may be unloaded while the cutters are working on pieces in the other vise, the tongue slots on this new vise accurately are cut with respect to their distances from the face of the solid jaw. Although the vise has been made low, full strength and clamping power are retained by casting a flange on all four edges of the vise, thus making it possible to bolt the vise in any position on the table. The jaws are of steel, are easily removed and may be replaced with special fixtures. The movable member is of ample thickness to permit the use of a large diameter screw. Tongues are milled at right angles to each other, so that the vise may



NEW VISE FOR MILLING MACHINES



AUTOMATIC SURFACE GRINDER

be held parallel or perpendicular to the spindle. To obviate any danger of breaking the vise in either end of the base, both ends are cored out, thus permitting an even distribution of metal which, it is said, eliminates shrinkage difficulties and any tendency to break at these points. The regular equipment includes a crank, clamps and bolts, and hardened and ground tongues.

New Surface Grinder

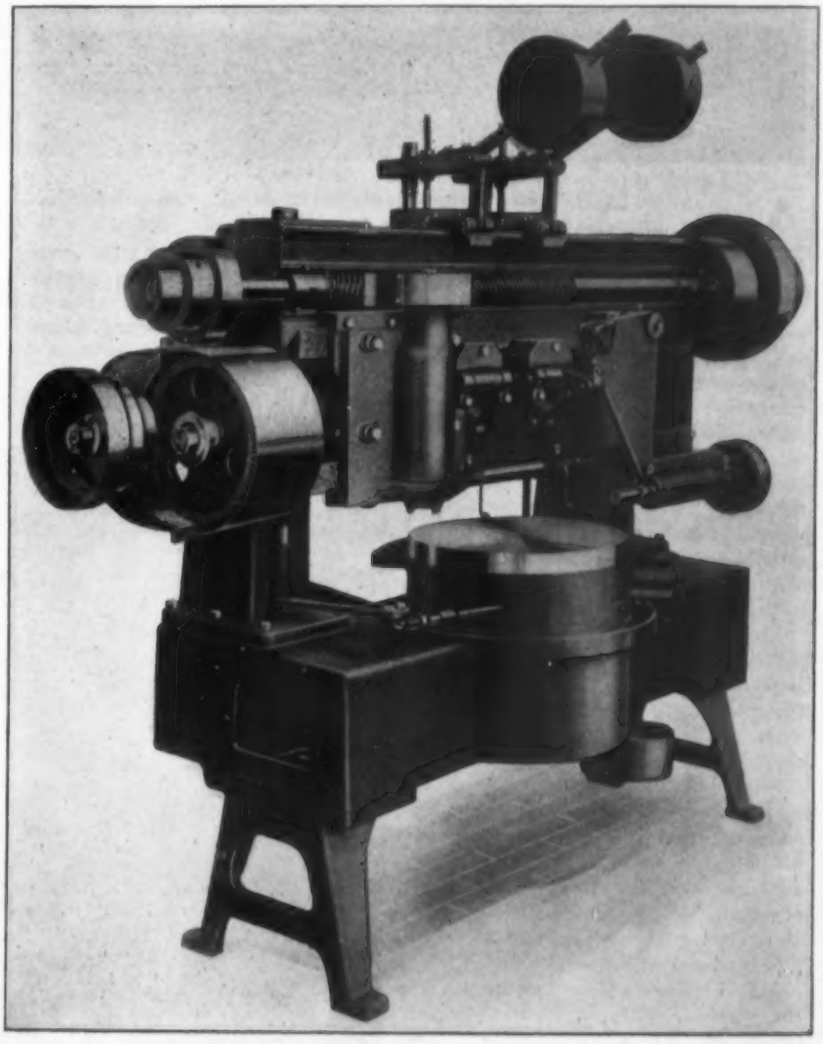
The accompanying illustration shows an automatic surface grinder built by the Noble & Westbrook Mfg. Co., Hartford, Conn., and designed principally to grind flat surfaces. The device for raising and lowering the table is equipped with thrust ball bearings. The feed is graduated into thousandths of an inch and all slides and spindles have bearings adjustable for wear. An automatic stop is fitted to the cross slide, thus obviating any danger of over-travel. The movable table may be started or stopped instantly in any desired position by means of a hand lever. This, however, does not interfere with the operation of the spindle or other parts of the machine. All working parts have been inclosed to keep out dust. The movement of the table is such as to permit a grinding capacity of not in excess of 8 x 20 inches. A 12 x ¾-inch emery wheel regularly is supplied. The spindle is 1-9/16 inches in diameter; the distance between spindle flanges is 1¼ inches, and the spindle bearings are 1-9/16 x 6 inches. Tight and loose pulleys, 7 x 4 inches in diameter, are fitted. Steel self-oiling hangers are supplied and the machine may be furnished with a magnetic chuck if desired.

Combination Milling and Drilling Machine

The Moline Machinery Co., Moline, Ill., has added to its regular line of machine tool products an additional unit designed primarily for performing milling and drilling operations on steering knuckles for automobiles. These two operations are performed without removing the part or reclamping it into another position on the revolving table. While the machine was designed principally for machining automobile steering knuckles, special attachments may be added for other operations.

Four spindles, three for drilling and one for milling, are provided. Of these three are driven by spiral gears, while the fourth is driven by a belt from the driving shaft. All spindles have cam feed, the amount of throw of the cams being varied to suit the work. Provision also has been made to adjust the spindles for the wear of tools; the milling spindle has a large taper bearing on the lower end, so that compensation may be made for wear of the cutting tool. The revolving table has a diameter of 20 inches and turns automatically one-sixth of a revolution after the tools are withdrawn. This partial revolution brings the fixture or part next to be machined into position for that operation. The machine has a total height of 6 feet and requires 5½ horsepower for operation. The work table is 3 feet above the floor.

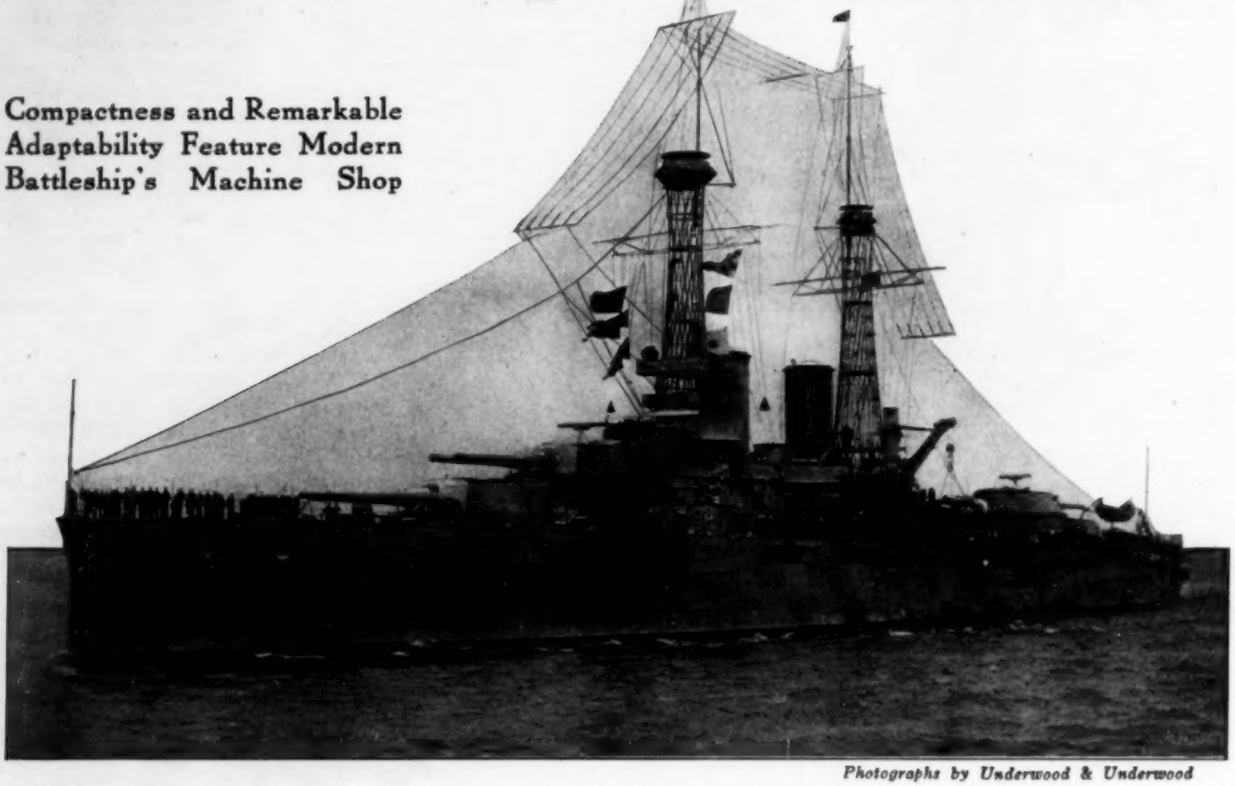
H. M. Lee, president and general manager of the Duplex Truck Co., Lansing, Mich, manufacturer of four-wheel drive trucks, states that the company shortly expects to have completed a two-story, 72 x 706-foot plant. In the past the truck was manufactured at Charlotte, Mich., but the arrangements were made to remove to Lansing, upon the reorganization of the old company.



COMBINED DRILLING AND MILLING MACHINE

Man-O-War's Repair Shop is Unique

Compactness and Remarkable Adaptability Feature Modern Battleship's Machine Shop

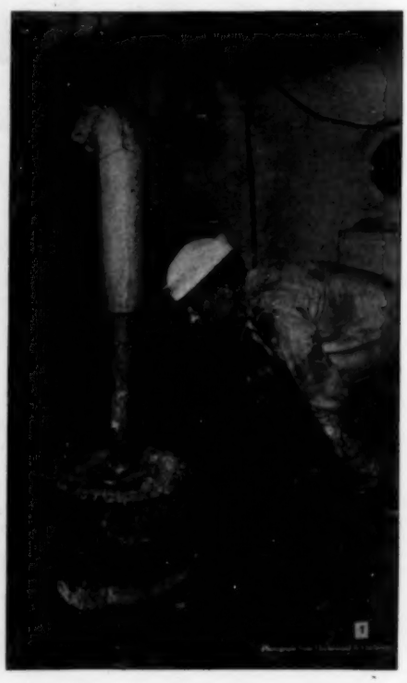


Photographs by Underwood & Underwood

AN ESSENTIAL feature of modern naval design is the provision of adequate facilities for making the repairs which are constantly necessary aboard so complicated a piece of mechanism as a battleship. Although a machine shop aboard one of Uncle Sam's capital sea fighters comprises only a few essential tools and is intended mainly for minor repair work, its range of usefulness is surprising. Indeed, it is a really serious emergency, such as the fracture of a propeller shaft, or failure of the intermediate or low pressure rings of the main engine, which cannot be remedied aboard ship immediately without reference to a navy yard. Supplementing the machine shop, are a brass and aluminum foundry, and coppersmith, blacksmith and tinsmith shops.

Although in laying out these departments it was borne in mind that space aboard a battleship is at a premium, there is plenty of room to handle all work which is likely to come within their scope. Such work includes the casting and machining of valve castings, eccentric straps, pump liners, flanges, the cutting of gears, the rebabbitting and boring of crank bearings for the main engine, the making of small hand forgings, the forming and riveting or brazing of tanks and pipe and many other operations.

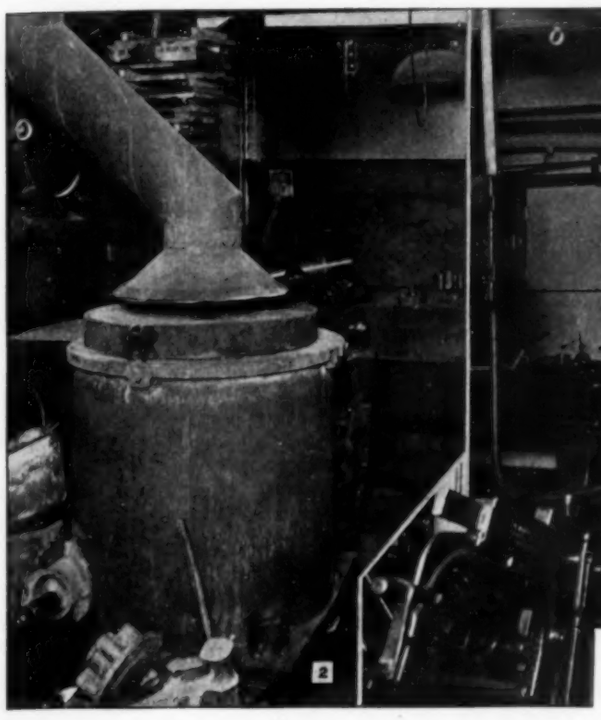
Fig. 4 shows the principal unit in the machine shop, a 24-inch engine lathe, 10 feet between centers, engaged in turning a 10-inch piston ring for the main circulating engine.

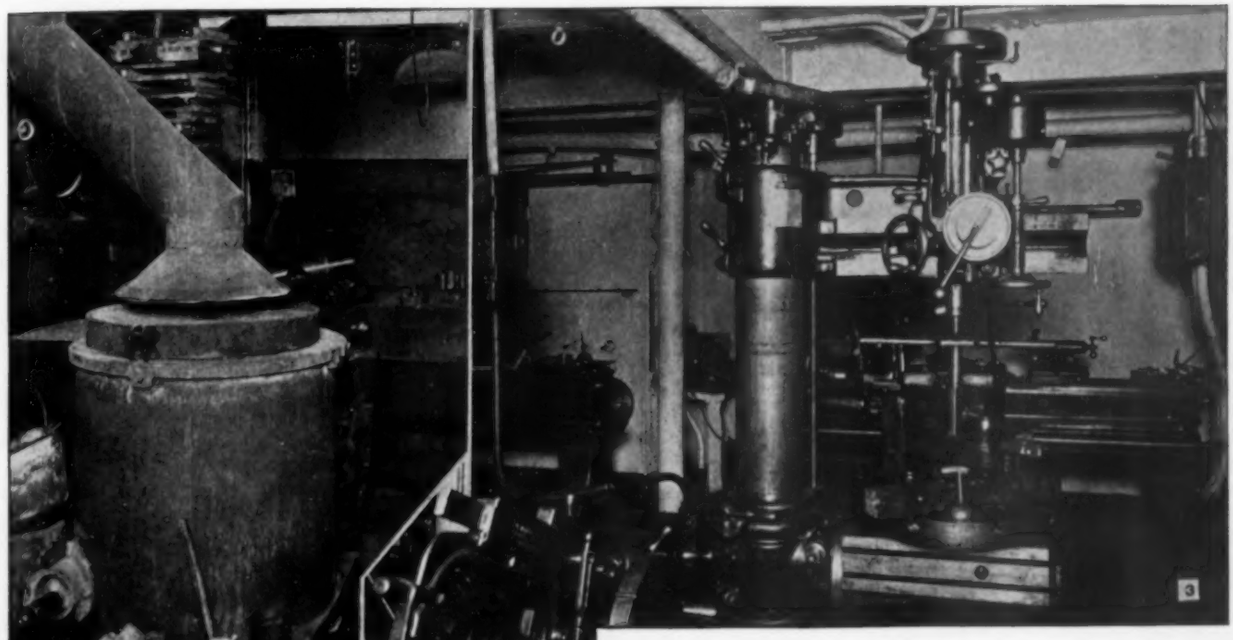


The lathe has a 3-foot gap permitting a swing of 48 inches. It is used principally for turning high-pressure follower rings, piston rings and eccentric straps for the main engine and for turning and boring pump liners.

Fig. 3 shows a corner of the machine shop with a 12-inch radial drill in the foreground. This machine is direct-driven by a 3-horsepower motor and is provided with a rotary table in order that the work may be set at any desired angle to the tool. Used for the boring of pump cylinder connections and for general drilling and boring operations, the machine as shown in the illustration is engaged in reaming a bushing in the valve gear arm of a fire and bilge pump. Other machines shown in this illustration are a 14-inch swing lathe, 48 inches between centers, direct driven by a 2-horsepower motor; a 14 x 60-inch tool lathe and a hacksaw direct-driven by a 1-horsepower motor.

Fig. 5 shows a No. 2 universal milling machine which is belt-driven by a 2-horsepower reversible motor. This machine is used for a large variety of purposes, including the cutting of gears, the machining of gear cutters, keyway cutters and special milling tools. It is provided with a complete assortment of keyway cutters, metal slitting saws and cutters for making drills, reamers, taps and other tools. As shown in the illustration, it is engaged in cutting a keyway in the valve arm of a fire and bilge pump. Additional tools in the machine shop in-

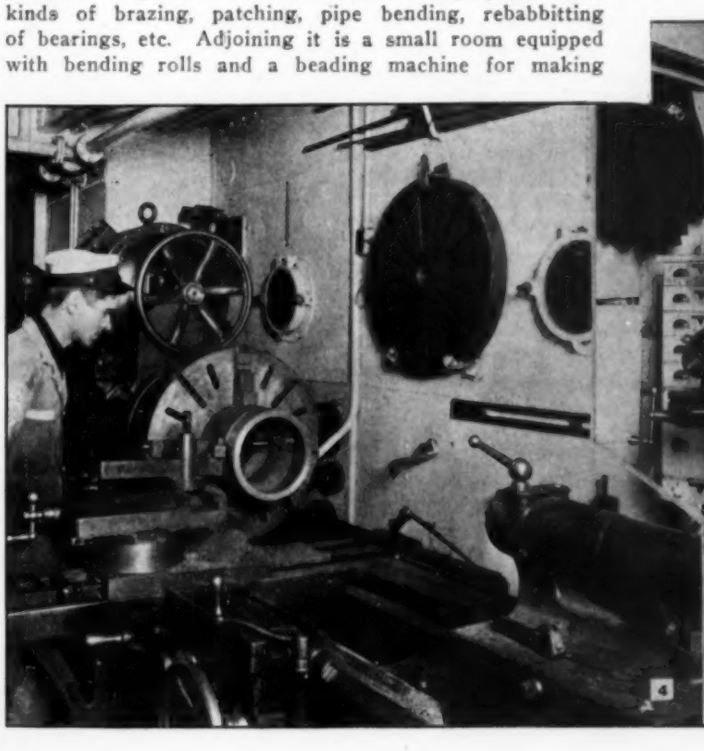




clude a 16-inch stroke shaper, which is used for planing valve seats and various other operations, including all kinds of small work; a sensitive drill for high-speed drilling; an emery grinder with surface grinder attachment for grinding castings and tools; a portable, electric-driven boring bar for boring out the main engine valve chest and high-pressure cylinder; threading machines with capacity for pipe up to 6 inches in diameter, and work benches and hand vises.

Fig. 1 shows the brazing of flanges on a copper pipe which is to be used in the battleship heating system. The coppersmith shop is provided with a portable coppersmith forge and blower which are employed for all kinds of brazing, patching, pipe bending, rebabbitting of bearings, etc. Adjoining it is a small room equipped with bending rolls and a beading machine for making air ducts, pipe coverings, galvanized copper gasoline tanks for motor boats, etc.

Fig. 2 shows the foundry. This departmnt is equipped with an oil-burning crucible furnace, having capacity for 200 pounds per heat; and with a combination sand bin and coremaker's bench, and all necessary molding equipment. It is provided with a stock of ingot brass and aluminum which, in conjunction with the scrap constantly accumulating aboard the vessel through the rejection of worn-out parts, is sufficient for all castings requirements. The castings most frequently made are valve seats, valve disks and other valve parts, and various pipe connections, such as tees, wyes, etc. Adjoining the foundry is the blacksmith shop which is equipped with forge, electric blower and anvil for producing hand forgings. A complete stock of metalworking tools is provided.



Industrial Uses of Refractories

Enumeration and Discussion of Properties Concerning Acid, Basic and Neutral Refractories—Mining and Preparation of Raw Materials—Molding, Burning and Physical Tests of the Brick

BY H. C. ARNOLD

THE questions which confront us in a study of refractories are: What constitutes a refractory? How did the need of such a substance develop? What substances, occurring in nature abundantly, possess most of these properties? How, if at all, can these substances be prepared or treated artificially so that they will fulfill the requirements that they lack? We can arrive at an answer to these questions most satisfactorily by first investigating the technical developments which led to the need of refractories.

Early in the history of metallurgy it was found that metals could be obtained from their compounds by reactions carried on at high temperatures which would not proceed under normal conditions. This fact led to the demand for a container in which such reactions could take place at high temperatures, but which would be entirely resistant to the action occurring and the heat developed. The early workers in metal used natural-occurring clays and clay mixes in fashioning their crucibles, cupelling furnaces and hearth furnaces. Thus, early in the history of metallurgy it was found that natural-occurring clays possessed this property of resistance to heat. With the nineteenth and twentieth century developments in metallurgical processes, the demand for refractories of a definite nature has increased. The other required properties also have increased to include not only resistance to high temperature, but quickly changing temperature, resistance to the metal, and the slag produced, the action of flames and gaseous productions of combustion, resistance to an abnormal abrasive action, and possession of high compressive strength. A refractory, in its application to metallurgical work, may be defined, then, as any substance applied as a lining or a container, which resists the action of heat, and other actions occurring during the operation.

No substance used possesses all the required properties, but combinations of substances have been determined which can be used. Up to the present those materials found best suited are compounds of alumina, silica, lime, magnesia, chromic oxide, carbon and a few metals, such as nickel and platinum. These substances may be used singly or in combination as compounds. Usually they do not possess all of the properties required of a refractory alone, and must be mixed, or used in the form of a compound.

The selection of a refractory, and even the design of a furnace itself, will depend largely upon the nature of the slag formed and the temperature required. Slags, depending upon the quantity of silica present, can be divided into acid, neutral and basic. Those which possess an acid nature will tend to react with bases to form a neutral salt; those high in bases will react with acids to produce a neutral salt. A basic slag would attack an acid refractory and dissolve enough of the lining to produce a neutral salt; and vice versa, an acid slag would attack a basic lining. Because of this nature of slags and the necessity of resisting any such corrosive action, refractories are produced of three different characters—acid, basic and neutral.

The acid refractories consist of those high in silica, such as ganister and quartzite which occur in nature, and preparations of these substances either in the mass or as silica brick. The basic refractories include magnesium carbonate and dolomite, a mixture of magnesium and calcium carbonates. The neutral refractories make up the largest division and include the fire clays, pure or nearly pure alundum, which is prepared from bauxite, silicon carbide compounds, carbon, chrome iron ore and various others.

Uses of Acid Refractories

The acid refractories are those high in silica which possess a high melting point. Such materials occur abundantly in nature. Quartzite, or ganister, sandstone, granite, gneisses and rhyolites—all have been used in the linings of furnaces in the natural state. Large blocks were cut from the mineral, trimmed to shape and used as linings. They were completely resistant to the action of the heat, but did not possess the other properties required for good refractory linings. Rapid heating and cooling caused splitting, cracking and spalling. High quartz materials on heating suffered permanent expansion beyond their normal expansion due to heat changes. They find application where expansion can take place with no harmful results. At present the natural rock is used as a quartzite cement and mortar in sintered bottoms of open-hearth furnaces, and copper reverberatory furnaces. The natural blocks, however, have given way to the artificially prepared quartzite or silica bricks in the roofs and side walls.

The quartzites of commercial importance in America are: The Medina, of Huntingdon and Blair counties, Pa.; that of the Baraboo district, Wisconsin, and the eastern Alabama deposits. The analyses are:

	Medina quartzite, per cent	Baraboo quartzite, per cent	Alabama quartzite per cent
Silica	97.80	97.15	97.70
Alumina	0.90	1.00	0.96
Iron oxide....	0.85	1.05	0.80
Lime	0.10	0.10	0.05
Magnesia	0.15	0.25	0.30
Alkalies	0.40	0.10	0.31

All quartz rocks or substances high in silica will not make good silica brick. Not only chemical composition, but also physical properties, such as structure, fusibility and action as to expansion during burning, have their effect on the final structure of the brick. Chemically, the quartzites must be high in silica, low in alkalies, but contain enough fluxing impurity to give the brick produced a bond. This impurity is usually an alumina and iron oxide content. The composition should range between 96 and 98 per cent silica, 1.75 to 2.5 per cent alumina and iron oxide, very little lime and magnesia, and less than 0.5 per cent alkalies.

The melting point of quartzite will depend to a certain extent on the composition, and accessory minerals. With increase in bases, the melting point decreases. Pure quartzite has a higher melting point than the quartzites used commercially, but does not produce a good sound brick and will

From a paper presented at the Boston meeting of the American Foundrymen's Association, Sept. 25, 1917. The author, H. C. Arnold, is an engineer, Ceramic department, University of Illinois, Urbana, Ill.

not have the physical strength required in metallurgical work. The melting or softening point varies from 3290 to 3360 degrees Fahr. Good quartzites must have a high melting point, although those having the highest will not make the best brick.

The structure of the rock is of considerable importance. The quartzites used in this country are hard, splintery rocks which break down to angular fragments having no rounded grains. Sandstones of equal purity chemically, because of the roundness of the grain, cannot be used in the production of brick.

The Manufacture of Silica Brick

All processes of manufacture of silica brick are fundamentally the same, differing only in the execution of certain steps in the process. In general, it is a grinding, mixing, forming, drying and burning process. The older methods included semidrying, re-pressing and then complete drying. Recently, however, by working the batch stiffer, re-pressing has been eliminated. The consistency is such that the brick retain their shapes after being dumped from the molds and they can be dried completely without re-pressing.

The method of winning raw material will depend to a large extent upon its occurrence. In places where the quartzite occurs as a talus it is only necessary to break the pieces to a size which can be handled and to transport them to the plant. Where the raw quartzite is quarried, the usual quarrying methods are used and the material loaded onto cars. Some plants are located a considerable distance from the quarry, and in this case shipment is made in freight cars. At the plant it is dumped from a trestle either directly into the jaw crusher, if it is to be used at once, or into a storage bin and then into the crusher. Great precaution is exercised in the selection of this raw material. The crusher used is the ordinary jaw crusher; it crushes the raw quarzite to pieces about 2 cubic inches in size. From here it is elevated, dropped into a steel hopper over a wet pan and is ready to feed into the pan for further grinding and mixing with lime. The wet pans are 7 to 9 feet in diameter and operate periodically, one charge being enough for 150 to 300 standard brick. Sufficient water is added to give the mass molding qualities, and in this water milk of lime is suspended to such a concentration as will add 2 per cent lime to the batch. The purpose of the lime additions is to give the brick a bond in the burned state. A greater amount of lime decreases the resistance of the brick to abrasion, and less lime makes it friable and crumbly to the fingers. High lime also decreases the refractoriness of the finished brick. The degree of fineness will depend upon the time of grinding. This will depend upon whether the batch is to be used in special shape or standard brick work. Because of the difficult shapes made, the special shape batch must be ground finer or longer than the standard brick batch. At one plant the time of one grinding is approximately 15 minutes for standard brick. This may be increased to 25 or 30 for special shapes.

The charge is removed from the wet pan by an automatic plow, which is lowered into the pan, scoops up the material and throws it over the side. Here it is either caught in a cart conveyor, or thrown onto a molding table or belt conveyor. In one plant the batch is elevated to large steel tanks where it comes down directly over the molding tables. Other plants transport the wet batch in dump cars to the floors on which the molding is to be done. At one plant part of it is trucked to the molding room after being elevated to a bin, and the rest is elevated and conveyed to the second floor where special shapes are produced. Here the shapes are made and dried on the hot floor. Molding the ware is done by hand. The batch is worked stiff, rammed into steel molds with pneumatic hammers or by hand, then inverted onto a pallet and the outside molds stripped off leaving the brick on the pallet. From two to 10 brick are made in one mold. The molds are made of steel and can easily be taken apart and put together. The brick are then placed on cars and pushed into drying tunnels through which they travel progressively. It takes from three to five days for the brick to pass through such a tunnel and during this time drying takes place. The tunnels are heated in various ways. A common method is to use the waste heat from cooling kilns. Air is drawn through the kiln, being cooled, passed down through large flues up into one end of the tunnel, through the tunnel and exhausted at the other end. Another method is to use the waste steam from a steam engine during working hours and live steam at night. Special shapes are dried on drying floors instead of the tunnels, owing to the variety of shapes. From here they are wheeled to the kiln.

The brick should leave the dryer completely dried and very sound. They are then taken by cars to the kiln and set for burning. The kilns are round or rectangular down-draft kilns. Soft coal is used for fuel. The burning to a maximum should be done very slowly, as rapid burning produces a shattering of the silicious material, and the development of cracks and fissures in the quartzite. An abnormal expansion which would simulate a true expansion could occur here by rapid heating, but the bricks would fail in any abrasive tests to which they might be subjected. Burning is continued slowly for seven or eight days, then the temperature held for 24 to 48 hours. Then the fires are drawn and the fireplaces sealed for 48 hours. After that one or two and finally all are opened. The whole cooling process requires 8 to 10 days. The cooling is just as important and requires as much or more care in producing a ware free from strains as the burning. From the kiln the bricks are taken either directly to the shipping platform or to the warehouse. Warehouses or storage rooms should be completely covered, free from water, and the brick fully protected from the action of the weather.

Tests of Silica Brick

Of primary importance in the physical properties of silica brick are its resistance to abrasion, cross-breaking strength, strength of compression, its thermal conductivity, refractoriness, load-carrying capacity at high temperature, and finally the amount of its permanent expansion after the first burning.

Resistance to abrasion can be determined by a modified sand-blast or rattler test. The rattler test as applied to paving brick has been especially successful. The rattler consists of a 14-sided steel barrel in which 10 standard brick and 300 pounds of spherical shot are placed and the whole rotated 1800 revolutions. The loss in weight of the brick is the criterion of the test. At the present time all the large cities and municipalities buy brick based entirely on their action in the rattler. A similar standardized test on fire brick required of the seller by the purchaser would certainly help in determining those brick which showed high resistance to abrasion.

Cross-breaking and crushing-strength tests have been used by various investigators in following the change in strength in a brick after different processes that the brick have been put through. In the cross-breaking test the brick are laid edgewise over a span of 6 inches and loaded at the center. The crushing strength is determined on a flat piece bedded firmly in a crushing-strength machine. Mc-

Dowell gives values for a regular grind brick of one burn of 700 to 900 pounds per square inch modulus of rupture; and crushing strength of 2100 to 2700 pounds per square inch. For an Illinois fire brick, Harvard gives the crushing strength on the side at 2345 pounds per square inch; on the edge, 1546 pounds per square inch, and on the end 2119 pounds per square inch.

Load-Carrying Capacity

Silica brick or any refractory brick which bear heavy loads at high temperatures should have high compressive strength at these temperatures. For fireclay brick such a test has been accurately worked out by Bleininger and Brown and will be described later. Silica brick tested by Brown in the same way showed excellent resisting qualities. A sample brick standing on end, subjected to a load of 50 pounds per square inch, held at 2460 degrees Fahr. for one hour showed no change. In another test the brick was subjected to a load of 50 pounds per square inch at 2680 degrees Fahr. without being affected. Other specifications than those used for firebrick could be made for silica brick. Such tests would be useful in bringing out the relative value of the various kinds of brick and in showing how these brick would act in a structure where they must carry a high load at high temperatures.

The thermal conductivity of silica brick is very low. In some structures this is an advantage, in others a decided disadvantage. Magnesite brick are better heat conductors. For certain purposes, as in coke oven work, any treatment which will increase the conductivity of silica brick would be valuable. In other operations the conductivity should be small, and those brick having a low conductivity should be used. Brown showed that silica brick had 8.99 per cent higher conductivity than clay brick. The state of division of material in the brick, the number of pores, the burning treatment and the composition all influence the conductivity.

Variation of Expansion

Silica brick on heating have a linear expansion due to the increase in temperature. Besides this increase in expansion, however, there is a permanent expansion due to a change in state in the raw material. This was previously discussed under the properties of raw quartzite. The linear expansion is entirely distinct from the permanent expansion and should be considered in any application of silica brick. It varies from 3.0 to 4.5 per cent. Bleninger showed that permanent expansion increases directly with the temperature; it does not coincide with the development of cristobalite. He suggests cones 18 to 20 as the minimum burning temperature for silica brick. It would seem that the complete development of tridymite in the brick as the stable phase is impractical for the manufacturer of silica brick. However, whatever this permanent expansion is, it should be known and allowance made for it when the brick are placed in a furnace wall.

The rate of heating has a great influence on the structure of the brick. Rapid heating will produce abnormal expansion, but the brick will not be sound. Disintegration of the body results and the resisting quality of the brick will be reduced. This is directly connected with the spalling tendency of a brick. Spalling is a breaking down of the brick structure due to too rapid changes of temperature. Although the only external evidence of spalling is the splitting off of pieces, still there is considerable effect on the internal structure. McDowell showed such a result by heating the brick up slowly, then cooling rapidly, but not so rapidly as to cause parts of the outside to break off. The cross-breaking strength on such treatment fell off considerably. Brick before being used should be tested for this property and those brick selected for use which offer the most resistance to spalling.

In the open hearths, silica brick are being used wherever possible. In the basic process, magnesia brick are used for the linings in contact with slag and metal, but above the slag line and in the roof silica brick are used to the greater extent. In the basic process the bottoms and part of the sides are made of magnesite brick and fused magnesite; between the top of the magnesite and the bottom of the silica a buffer layer of refractory chrome brick is used. In the acid type, silica brick are used for the bottom and covered with fritted sand.

The acid-bessemer converter uses a lining of silica brick, but in the basic process the complete lining is of magnesite and magnesite brick. With the decreasing use of the bessemer and increasing use of the open hearth, the demand for silica brick will naturally show an increase.

The most common materials used in basic and neutral refractories are the crystalline or amorphous mineral magnesite, and dolomite. Other magnesian minerals have been used alone and in combination with fire clays as a heat resister for years. The various forms of asbestos, serpentines, steatites and soapstones have been used. The melting points of both lime and magnesia are very high; Harvard gives values for magnesia as high as 4532 degrees Fahr. where it forms a viscous mass. Rankin and Wright estimate the melting point of lime at 4660 degrees Fahr.

The use of lime alone as a refractory has not been successful, partly because of its affinity for moisture and because of the formation of calcium salts of iron. Judging from its refractoriness alone, it could make as equally valuable a refractory as the magnesia.

Europe Chief Source of Magnesite

Magnesite used in the manufacture of magnesite brick is produced largely in Europe. There are two grades, the amorphous, produced in Greece and Norway, and the crystalline from Syria. Deposits in America are just beginning to be worked. California has notable deposits. The United States geological survey reports that in 1914, 4 per cent of the magnesite used was domestic production, 93 per cent was imported from Austria and the remainder came from Greece. Since the war, domestic consumption has increased. On the whole, however, it is extremely doubtful whether the American deposits can supply the demand as long as the foreign deposits are available, both because of the nature of the material and because of the small size of the deposits so far located. Youngman gives the following analyses:

	Crystalline from Austro-Hungary, per cent	White variety from Syria, per cent
Silica	2.75	2.50
Alumina	0.50	0.24
Iron oxide	7.00	1.00
Lime	2.50	2.25
Magnesia	87.00	93.00
Alkalies	0.75	[1].00

Non-crystalline deposits in Greece, and magnesite quarries of Austria, contain magnesite in large quantities, the Grecian is used more for the sorrel cement industry and the Austrian for the refractory industry. The massive variety has a whitish yellow color, while the crystalline is blue-gray to drab and contains pieces of slate.

The Austrian deposit is worked in benches of 50 feet in height. The rock is blasted out, broken down and sorted. The quarries are above the level of the plant so that the material can be loaded on the cars and dropped by gravity to the mill.

Degree of Burning

Magnesite is either caustic or calcine burned, or dead burned, depending upon how it is to be used. The caustic burn corresponds to the treatment of limestone in the production of quick lime. The raw magnesite is

burned to from 1850 to 2000 degrees Fahr., in which state it retains about 3.0 per cent of its CO_2 content. This leaves the mass active and capable of recombining with various substances.

In the dead burned variety, the magnesite is burned to a sinter. All the CO_2 is removed and the substance largely loses its power to recombine with other substances. It is nonhygroscopic and has all shrinkage removed; it becomes chemically inert and in this form acts as a refractory of good quality. It is burned to a temperature of 3260 degrees Fahr. As the Austrian magnesite contains 2.5 per cent iron oxide, it will burn to a dense mass at a lower temperature than the Grecian material and still be sufficiently refractory for commercial purposes.

Magnesite brick are composed of 15 to 25 per cent low calcined magnesite, 2 to 3 per cent iron oxide added to increase the bond, and dead burned magnesite. About 50 per cent of the dead burned magnesite imported to this country is used directly in the grain form to sinter on to the bottom of open hearths and used as a cementing filter in other places, as in the basic bessemer converter.

Iron oxide is added with the original raw batch of calcine and is added to the final mix in this form. These two ingredients, calcined magnesite and deal burned magnesite, are mixed together. Sometimes a binder is added, such as various tars, alkalies, etc., at the expense of the caustic magnesite. However, the common practice is to use no bond. The brick are molded by hand or pressed by steam, dried and burned. In order to provide a method of burning, compartments are built of silica brick; in these compartments the brick can be arranged in two layers or two brick on end, so that the most weight one brick bears is that of the brick on top of it. This is necessary because of the weak bond of the raw brick. The temperature of burning varies from 2160 to 3000 degrees Fahr. The increase in temperature must be slow to prevent cracking.

Properties of Manganese Brick

The tests will not differ essentially from those on silica brick. The basic refractory, however, will not show the strength shown by the silica brick. It is ordinarily of high refractoriness, although in some cases it has been known to fail at low temperatures. The brick has a great tendency to spall and crumble with sudden temperature changes and at extremely high heat. The exact action will depend upon the chemical and physical properties of the raw material, but to a large extent also on the method of manufacturing, grinding, tempering, drying and especially burning. Specifications have not yet been outlined for all tests on the physical restivity of magnesite brick. They will undoubtedly form part of the complete specifications on refractories which are being prepared by the American Society for Testing Materials. Any improvement in batch, or method of manufacture which will decrease the tendency to spall will be a great step forward in its practical application to the industries.

Dolomite is used to some extent as a lining in place of magnesite. It is a magnesium carbonate in which part of the magnesia has been replaced by calcium. It can be obtained cheaper than the magnesite and for that reason has somewhat replaced it, but it is not satisfactory when made into brick, as it tends to crack at high temperature. It has, however, found considerable use as a lining.

Fire Clay Brick and Shapes

With the improvements in the manufacture of silica brick which have greatly extended their use, the fire brick have gradually given place to them in certain metallurgical processes. Magnesite and bauxite brick, too, have decreased the use of fire brick because of their better adaptability, due to an increased refractoriness, or a more favorable chemical nature. There are, however, numerous operations in metallurgical and high temperature work where fire brick and fire clay shapes will continue to be used extensively.

Clay is an alteration or decomposition product of various minerals which have separated from igneous solution. Its history on earth may have been so varied that it has lost all trace of its original character, but the origin of all clays is traceable to this weathering action on such minerals. Natural agencies have eroded, transported, mixed and re-deposited the original decomposition product and have formed beds and deposits of clays. Further action, such as plant life, metamorphism and percolating underground waters have again altered the original deposit. Thus, in the earth we have all degrees of this process from the original decomposition product called residual clays, through the various recently developed beds of sedimentary clays containing impurities of all sorts, to the metamorphosed re-purified beds which have the same chemical composition as the original decomposition product and which form the greatest part of our commercial fire clay deposits. The impurities present are either from the original undecomposed rock or another product of the decomposition, from admixed material during the process of transportation of the clay, or substances carried into the clay body later by action of the water. Such impurities decrease the refractoriness of the clay. They have numerous other bad effects which make the clay unfit for other purposes, but their general effect on refractoriness is the point in which we are interested.

Such relatively pure clays are high in alumina; pure clay itself contains 46.4 per cent silica, 39.7 per cent alumina and 13.9 per cent water. Fire clays differ in the degree of their plasticity, or their ability to take up water to form a plastic mass. According to this physical property, fire clays are divided into plastic and nonplastic. The nonplastic, or flint clays, are those which develop low plasticity on treatment with water, and have a very high melting point. Plastic fire clays are those relatively pure clays which have a distinct plasticity on treatment with water and which have a high melting or softening point. Sufficient alumina should be present in the fire clay to combine with the silica to form kaolin, Al_2O_3, $2SiO_2$. Any excess of silica over this amount will act as a flux in the clay. It may be present combined with an oxide forming a silicate, but in this case the silicate acts on the clay to reduce its refractoriness. The plastic clays are generally of lower refractoriness than the flint clays and when used in the production of fire brick or shapes are used merely as a bond.

Purdy states that the fusion point of a clay is influenced by the following factors:

1.—Manner of combination of the constituents in the clay.

2.—Size of grains of the several mineral constituents.

3.—Amount, form and character of the volatile constituents do not directly affect the reactions, but the difference in the physical structure of the clay and stability of the nonvolatilized compounds caused by the expulsion of these substances affects the manner of fusion.

4.—Absorbed salts.

5.—Precipitated materials present.

Fusion Point of Clay

These conditions so influence the refractoriness of the clay that usually one cannot infer its fusing point from the chemical analysis of the clay alone. The only safe test is a test of the clay itself. Small cones are made of the unknown clay and are heated at a constant rate until they bend over or ball up. The temperature at

which this action occurs is taken as the fusing point.

Most fire clays being mined at present occur in the coal measures, usually underlying a coal seam. Large deposits are found in Pennsylvania, New Jersey, Ohio, Kentucky, Missouri and Illinois. The higher grades of plastic clays are found in New Jersey and Pennsylvania, the flint clays in Pennsylvania, Ohio, Kentucky and Missouri. The clay found underlying coal is usually pure because of the action of the ancient plant life (which now makes up the coal beds) on the salts in the clay. These plants, in search of food, removed the alkalies and salts in the clay and left it free from impurities. Fire clays, both plastic and flint, are usually mined by operations quite similar to those employed in coal mining. The vein is worked in rooms; the clay is blasted down, loaded on cars and elevated to the surface. Because of the lack of cleavage in the vein, machinery has not been used in pulling the clay down.

How Fire Clay Refractories Are Made

Fire clay bricks and shapes are made up of the two materials, flint clay and plastic clay, and a third, grog. Grog is a clay from which all shrinkage has been removed by burning. It consists of either flint clay, calcined, or old fire brick bats and shapes, ground up to be added to the batch. These three materials, flint clay, plastic clay and grog, are worked together through the preparing plant and mixed in a wet pan. Of the three constituents the plastic clay is usually the least refractory and weakest. In some cases grog, coming originally from a poor quality brick, will fail before the plastic clay, but this can be prevented by completely eliminating every kind of grog except calcined flint clay, and adding only the best flint clay as calcine. It is necessary, however, to add some plastic clay. Something is needed to bond thoroughly the flint clay and the calcine and to give the brick a sound, firm structure. This is accomplished by the plastic clay.

The proportioning of the mix will depend upon the use to which the brick or shape is to be put and where it is to be located in any given furnace. Some brick must resist high temperatures under load; others are subject to enormous abrasive action; some must resist rapid heating and cooling; and still others must resist chemical action. These considerations will influence, if not finally determine, the exact proportions of the three components which make up the brick or shapes. As an example, we may consider the action occurring at different places in a cupola or blast furnace. Near the top of the shaft the fire clay sides are subject to enormous abrasive action; raw materials fed in at the top gradually scrape their way toward the bottom. Up to the point where melting first begins and a pasty mass is produced, the lining does not need to withstand a particularly high temperature, but in must be resistant to abrasion. A dense, hard material, which, may or may not be highly refractory, and which usually is not, should be used. In this brick or block, the amount of plastic clay will be greater than the other constituents, because the plastic clay, reinforced with some flint and calcined clay, will give a dense, hard struction on burning. Farther down the cupola the proportioning of the mass will be governed by resistance to slag action, to high temperature and to high temperature under load conditions. Its requirements vary from low refractoriness with abrasive strength at the top, to extremely high refractoriness at the hearth and bosh. For such work in blast furnaces, hearth and bosh, inwall and top brick are made. For the hearth and bosh, the brick are made of maximum refractoriness; for the inwall they are made for refractoriness and strength in abrasion; and for the top, the brick are of a dense and tough structure. In a similar way with other operations, the proportioning of the material will depend upon the operation and action which the brick must resist.

After the three ingredients are thoroughly pugged together, the plastic mass, commonly called the pug, is aged, to produce a homogeneous material with a uniform water content which will allow a uniform shrinkage. Molding and drying are quite similar to the methods used in the manufacture of silica brick. The temperature of burning is from 2550 to 2650 degrees Fahr. Coal or producer gas is used. After reaching the maximum temperature the firing is stopped, the kiln is sealed up for three or four days and the brick allowed to anneal. Cooling to normal temperature takes three or four more days. The brick are then removed, stored or shipped.

Determining Properties of Brick by Test

Before fire brick is put into use a sample brick should be subjected to certain tests which reproduce as nearly as possible the action which the brick will be called upon the resist while in a structure. Those brick which show up best in these tests are the ones which will naturally be used. Such tests are tests for compression, crossbreaking, strength, spalling, resistance to abrasion, action under load at high temperature, slag, refractoriness, thermal conductivity, coefficient of expansion, etc. It is the work of the American Society for Testing Materials to study various aspects of the problem and to specify those tests which will show in a practicable manner the future action of any given material in its application to the work for which it was intended.

Nesbit and Bell in Transactions of the American Society for Testing Materials, have worked out a series of tests for fire bricks which can be conducted at any plant at a small expense and with very desirable results. Tests for impact, abrasion, spalling, slagging, compression, expansion and contraction were published in the July 26, 1917, issue of THE IRON TRADE REVIEW in an article entitled "Progress in Making Silica Brick". Two other important properties which should be tested by a plant are the fusibility and load resisting qualities.

Conducting Test on Slagging

From a number of experiments Nesbit and Bell came to the result that the best method of testing the brick for slagging was by drilling holes partially through the brick and filling them with the slag to which they would probably be exposed in use. The length of the brick is bisected by a line, and in the center of each half a hole 2½ inches in diameter and ½-inch deep is drilled. The brick are placed level in a cold furnace and heated to 2460 degrees Fahr. as before. At this temperature 35 grams of standard blast furnace slag are placed in one cavity, and 35 grams of standard heating furnace slag in the other. The brick are held at this temperature for two hours after the slag is added. At the end of that time the furnace is cooled, the bricks are sawed longitudinally directly through the center of the cavity. The area of penetration is determined and from this is subtracted the original cross section. The difference is a measure of the action of the brick toward the slag.

Nesbit and Bell's tests for compression was by measuring the penetration of a steel sphere under a given load. The brick rests upon a solid foundation; directly over the brick is a channel iron, fulcrumed at one end and with weights applied at the other, the total weight being 1600 pounds. The brick is heated as before, removed and placed flat beneath the bar. A spherical impression in the bar marks the position of the ball. The ball is then put in contact with the center of the brick and the depression

in the bar. Weight is applied immediately and maintained for five minutes. The depth of the impression is a measure of the compressive strength of the brick at high temperature.

A method of determining the compressive strength at high temperature has been worked out by Bleininger and Brown. Their work in this connection is exhaustive; it not only brings about a measure of load carrying capacity of the brick at high temperature, but it also indicates how the brick fails, what compounds are the first to give way and how a better body could be developed.

Depending upon the amount of deformation at 2460 degrees Fahr. and 50 pounds pressure per square inch when held for one hour, they have proposed the following classification:

1. (*A*).—Those clay refractories which do not show a deformation below cone 31 or 3182 degrees Fahr., and when tested for load-carrying capacity will not show a deformation of more than 1 inch in 9 inches. Later specifications change this to ½-inch.

1 (*B*).—Those refractories which withstand a temperature up to cone 31, 3182 degrees Fahr. and in load-carrying capacities will not show a deformation more than 1 inch in 9 inches under a load of 30 pounds pressure per square inch.

No. 2 Refractories.—Those which will not soften below cone, 28 or 3074 degrees Fahr. They should be able to withstand a load of 25 pounds per square inch at 2380 degrees Fahr. without contraction of over 1 inch in 9 inches.

Similar tests made on every shipment of brick or shapes used in a structure will determine to a large extent their value for a particular operation. Those brick should be used which show the greatest resistance to the particular action to which they will be subjected when in use.

Other refractories are bauxite brick, chrome brick, materials containing carbon as the chief refractory, carbon-silicon compounds, cement, mortars, the metal refractories and many others. A discussion of the use and preparation of all these different substances would, however, lead too far afield. Of most importance to the iron worker is probably the chrome brick, which, because of its great refractoriness, can be used in the basic open hearth as a buffer lining between the magnesite and silica. Chromite is found as a chrome iron ore, a dark, metallic, splendent mineral of extreme hardness, containing 40 to 50 per cent chromic oxide. Although chromic oxide itself is extremely refractory, the chromite ore mixed with iron oxide, alumina and silica, is much less refractory. It is, however, sufficiently resistant to withstand the temperatures in the open hearth and its neutral nature makes it very resistant to the slags formed in the melting. It is used to cover ports as a liner between the magnesite bottom and the clay brick foundation of the open hearth.

Various reports are given as to the strength and action of chrome brick while in operation. Havard reports that they are unreliable at a temperature about 2730 degrees Fahr., and that at 3270 degrees Fahr. they become soft and crumbly. American practice, however, is to use them where a neutral lining is desired.

Meet Airplane Tool Needs Readily

(*Concluded from Page* 1207)

Because of the retrenchment inaugurated by automobile makers in general, these interests have relinquished their plans to increase production capacities, with the result that they have been willing to be relieved of their contract obligations for new tools. A large number of machine tools which otherwise would have been diverted to the manufacture of automobiles, were made available for the manufacture of airplane motor parts in this manner. By many it is thought that the cancellations of tools from automobile makers neutralized the demand created by the airplane industry. That this statement is not exaggerated may be deduced from a comparison of the output of a leading maker of low-priced automobiles, which totaled 350,000 last year, with the 20,000 airplane motors to be built by the government. Although this comparison does not take into account the factors of quality, accuracy and additional care required in the case of the latter, still it is evident that these two industries at the present time are widely separated when measured by the scale of invested capital, and that the sudden diminution of the needs of the former must more than have compensated for the needs of the latter.

The demand for machine tools made by the airplane industry has been of material benefit to the former because the requirements of the airplane makers have become urgent at a time when the production of pleasure cars has been diminished. Cancellations of machine tool contracts made by automobile makers have supplied largely the airplane makers' needs, such that where otherwise the market would have been flooded with tools of a certain kind, now the necessary balance between supply and demand has been more nearly equalized. In short, the airplane makers' needs became urgent at a most advantageous time to the machine tool industry, and have tended to equalize the production of tools of both light and heavy types.

It is evident that the crest of the buying movement for plants engaged in airplane motor work has passed—at least for the first fleet of 20,000 airplanes provided for in the first appropriation. Should congress appropriate more money at any time for additional aircraft of this type, further buying may be expected, but it would appear that the recent announcement made by the aircraft production board to the effect that the liberty motor successfully has completed all tests; that all contracts have been let, and that according to present plans deliveries would commence about Dec. 1, would indicate that the apex of the buying movement of the airplane industry, as affecting the machine tool industry at least, has been reached.

Obviously after the termination of the war, many plants built for the production of airplane parts, accessories and motors will be confronted by a situation akin to that which exists in the automobile industry today. Certainly the years immediately following the war will be devoted to the most urgent task—that of rebuilding the devastated countries. If this is true, then, while the nations are recuperating from the effects of the conflict, the production of this literally war-born industry—airplanes—will fall sharply. Many plants thus engaged accordingly will then probably be turned to the production of essentials needed in carrying out the process of reconstruction, while others likely will be dismantled and the equipment sold. There is a possibility that the latter may be a basic factorr tending toward the unstabilization of the machine tool industry. The effect of this procedure only will increase the number of tools then on the market, for there is a possibility that many tools will be offered for sale by those who have been engaged in the making of shells and other war materials. It is not at all improbable that this procedure will be followed, because the maker may charge the cost of his equipment against his contract, so that upon the completion of his contract, his equipment will have been paid for and whatever he is able to realize on his machine tool equipment will mean just so much profit. This is known to have been done in the case of several Canadian shellmakers. Perhaps the most effective means for machine tool builders to meet this situation was suggested at the convention of the National Machine Tool Builders association held in New York recently, when it was advocated that the energies of builders and dealers be turned toward the cultivation of foreign markets.

Develops New Blow Torch Of Novel Design

A unique blow torch, which operates with either natural or illuminating gas and which is designed to produce high temperatures by employing a pressure fan, integral with the torch, to mix gas and air for combustion, now is being marketed by the Naab Mfg. Co., Cleveland. Essentially, the apparatus consists of a portable gas torch which is entirely self-contained. The pressure fan is attached directly to the burner, thus tending to eliminate any air leakage. The function of the fan is thoroughly to mix gas and air, in a proportion such as to stimulate perfect combustion before the mixture enters the burner. In the burner, however, a series of holes are provided for supplying additional air. Adjustment of the flame, it is said, can be made such that any length of flame from 3 inches to 24 inches can be produced and any temperature attained up to 2500 degrees Fahr. When operating at capacity, the maximum gas consumption is said to be 180 cubic feet per hour, while the current consumption during the same period of time is said to be 80 watts, or 0.08 kilowatts per hour. A motor of the universal type is fitted, so that the torch may be operated either with direct or alternating current. The outfit weighs 23 pounds complete.

NEW BLOW TORCH

Portable Conveyor

The Portable Machinery Co., Passaic, N. J., has developed a new type of portable belt conveyor which is operated either by an electric motor or a gasoline engine. The machine consists, essentially, of a light but substantial frame mounted on wheels; the conveyor proper consisting of a chain-driven movable belt. A scoop is fitted to the receiving end of the conveyor, so that for transporting loose materials, the scoop merely is pushed into the material to be moved and the belt set in motion. One man, it is said, easily handles the apparatus. Tests conducted with the apparatus are said to have shown that when coal, coke, crushed stone or other loose materials are handled, as much as one and one-half tons per hour may be transported. Recently the conveyor has been used for handling, storing and shipping boxes, packages and manufactured products. Owing to the present need for loading and unloading freight cars quickly, the conveyor, it is said, has found extensive use among manufacturers.

Builds New Heavy Duty Disc Grinder

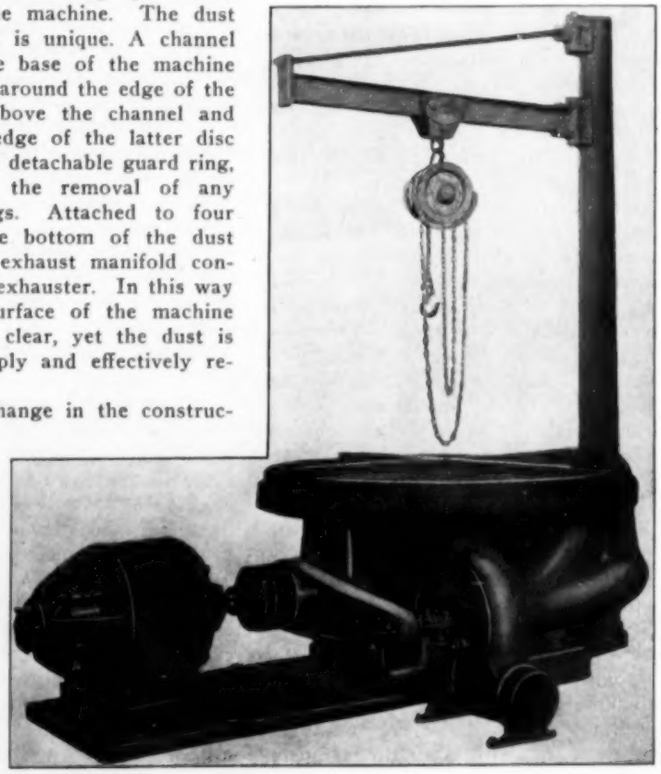
The Gardner Machine Co., Beloit, Wis., is developing a heavy duty vertical spindle disc grinder, shown in the accompanying illustration.

The hoisting attachment for handling the heavy pieces which this machine is built to grind is also designed to apply and remove pressure weights used in grinding lighter castings. This attachment consists, briefly, of a hand one-quarter-ton chain hoist, mounted on a trolley and swinging jib. A crane column to which this jib is attached is rigidly fixed to the base of the machine. The dust exhaust system is unique. A channel is cast into the base of the machine just below and around the edge of the disc wheel. Above the channel and just over the edge of the latter disc wheel is fixed a detachable guard ring, which permits the removal of any coarse grindings. Attached to four openings in the bottom of the dust channel, is an exhaust manifold connected with an exhauster. In this way the grinding surface of the machine is left entirely clear, yet the dust is said to be simply and effectively removed.

A valuable change in the construction of this machine is that by which it is made adaptable to direct-connected motor drive. In the belt-driven type, the countershaft, which carries the tight and loose pulleys, is connected to the driving shaft by a flange coupling. By removing this countershaft and the outer bearing a motor may be mounted on a plate bolted to the sub-base, as shown in the illustration. The rotor shaft of the motor is connected to the driving shaft by means of a flexible coupling.

The 53-inch disc wheel is carried on a spindle 3⅝ inches in diameter and supported by a heavy cast-iron flange, 20 inches in diameter by 1⅜ inches thick. The spindle is mounted in two self-aligning radial ball bearings and the end thrust is taken on a heavy thrust bearing, the balls of which are 1⅛ inches in diameter. The machine has been equipped with ball bearings throughout, another change from the old type which insures smooth running qualities and a marked saving in power. The spindle has a speed of 500 revolutions per minute and is driven by means of a pair of hardened steel bevel gears, having a ratio of 2.4 to 1. All gears are enclosed, and ample provision is made for lubrication. The weight of the complete grinder is 4600 pounds.

A contract for cylinder castings and other parts for 5000 aviation motors for the Curtiss interests has been accepted by the Falls Motors Corp., Sheboygan Falls, Wis. Deliveries will begin soon. Upon the completion of the order, it is stated that further contracts will be placed.



DISC GRINDER FOR HEAVY WORK

Six-Spindle Vertical Lathe

An automatic vertical lathe embodying old and new principles of construction has been developed by the Bullard Machine Tool Co., Bridgeport, Conn. The machine is composed of six independent lathes arranged in a circle and having five tool-carrying heads. It is built in two types, the universal type facing, boring and turning in any angle, and the compound type facing, boring and turning in vertical and horizontal directions only.

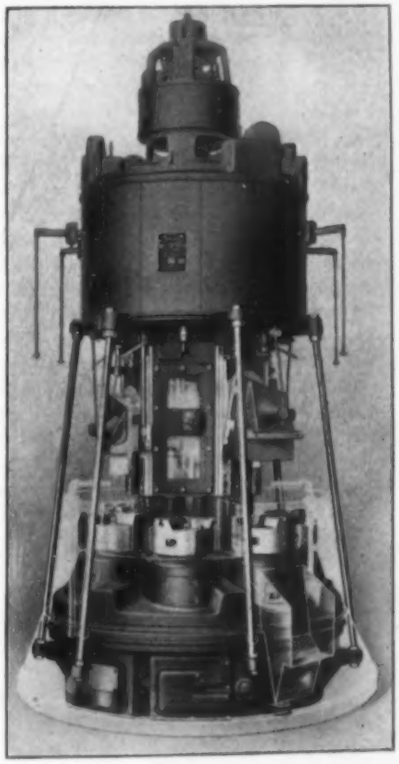
All gears and clutches are heat treated before being installed in the machine. Gears used for direct driving are manufactured from chrome-nickel steel. Those used for the feed mechanism are made of a selected quality of nonalloy steel. All movable parts connected with the driving, feeding and indexing mechanism are encased within the lathe. The table spindles and bearings and the carrier and base bearings are likewise enclosed. By so protecting these parts, grinding solutions can be used on any lathe without detrimental effect.

With the exception of the sliding surfaces of the tool-carrying heads, the entire machine is lubricated by the continuous flow system, the flow of oil depending on the operation of the motor. This system maintains an unintermitted film of oil between the shafts, bearings and gear teeth while the various units are in operation. Regardless of the speed attained by the various spindles, individual operations such as the indexing of the carrier, engagement of the rapid advance gears and feeds, return of the heads and the application of driving power to the spindles, are entirely automatic and maintain a constant rate of speed.

All movable parts of the machine are protected against damage by having automatic movements interlocked and co-ordinated. For instance ,a positive stop, which is adjusted independently, is provided for the tool head of each lathe. The exact limitation of the tool movement is obtained by engaging a reverse clutch while under load. The feeding pressure is adjustable to a predetermined point by means of a balanced weighing system. After the spindles are indexed, the tool-carrying heads are advanced rapidly to the point selected for beginning of the feed. The feed is then automatically engaged and when each cut is completed, the hand of the tool-carrying head is rapidly returned to its normal position, the rate of advance and return being constant and independent of the selection of the feed.

An individual manual control is provided for operating each head independently by hand. The maximum vertical movement of each tool head is 18 inches. A safety lever is installed at the chucking station by means of which the indexing mechanism is engaged or disengaged. The time loss in a fuel return movement of the tool carrying heads when short work is being machined is eliminated by adjusting the return travel of the tool-carrying heads to varying lengths of work.

The machine shown in the accompanying illustration is circular and occupies a projected area of approximately 6 feet in diameter. It weighs



SIX-SPINDLE, AUTOMATIC BORING, TURNING AND FACING LATHE

21,000 pounds, and, including the motor, is 12¼ feet high. Each lathe will machine material up to 14 inches in diameter and 9 inches in height. Each spindle whose nose is 14 inches in diameter has 10 independent speed changes ranging from 17 to 190 revolutions per minute. A three-jaw chuck, 14 inches in diameter, is designed for operating in conjunction with any of the tool-carrying heads. Each head is adapted for 12 independent sizes of feeds ranging from 0.00625 inch to 0.125 inch per revolution of spindle. Each lathe has a boring capacity of 6 inches with, and 9 inches without a pilot. When facing in horizontal and angular directions, 6 inches is the maximum possible distance.

Crane Construction

The salient features of electric traveling crane construction were discussed by T. E. Austin, assistant general manager of the Niles Crane Works, Philadelphia, at a meeting of the Cleveland Engineering Society, held recently. Mr. Austin prefaced his remarks in regard to the subject, with an enumeration of the great responsibility which rests on the modern engineer. The American engineer, he said, has done a remarkable work in tagging and indexing domestic manufacturers, their products and their resources in the gigantic task of putting the nation on a war footing. The steel plant, one of war's greatest adjuncts, was characterized as having been made possible only by the invention of the electric traveling crane. Important principles of design brought out in the talk follow: Safety of operation; quick response to control; efficiency; adaptability and accessibility. Insofar as safety is concerned the crane should have ample reserve strength to compensate for wear and should be adequately equipped with devices for protection of the operator or repairmen who may be at work on the crane. In respect to quick response to control or regulation, the crane should be so constructed that the load quickly may be transported from point to point. Regulation also is important in that the nicety of the operation of various parts may qualify the crane for many kinds of work which otherwise it might not be able to perform. Adaptability has to do with the ability of the crane to be put to various kinds of work, as well as the ability of the maker to so build a crane that it may be standardized and used for various purposes in manufacturing establishments of different kinds. Accessibility affects the cost of repairs which become necessary with new equipment.

Mr. Austin discussed the respective merits of various types of cranes, including the girder crane, the web type and the lattice type. The latter type was said to be particularly desirable where a long span exists, but that the labor cost involved in building a crane of this type generally is excessive. One of the good features of a lattice type of crane is the small amount of headroom required, measured above the rails. The importance of proper braking features and the proper functioning of a limit-switch was emphasized. Practical experience concludes that, after all, the best limit switch is the careful operator and that the personal element enters largely in the proper working on an electric traveling crane; that attention to lubrication, care in cleaning, attention to unusual noises and care in operation are factors ranking high in importance with design itself.

To Make Industrial Defectives Fit

Dr. John H. Quayle, Proponent of the Physical Reclamation Plan for the Men Rejected as Unfit for Military Service, Believes His Method Should be Applied to American Workingmen

BY JOHN GOLDSTROM

IS IT worth $100 a man to reclaim American men for industry? It has been proposed to the government of the United States that it is worth that much to reclaim a man rejected as unfit for military service. The proposition is before congress in a bill introduced by Senator Atlee Pomerene, of Ohio, who has proposed various administration measures in the senate.

The senate committee on military affairs is expected to report the bill early in the present session of congress. Advocates of the measure agree with Dr. John H. Quayle, of Cleveland, that congress should appropriate $100,000,000 for reclamation camps in various parts of the United States, and the bill so provides. The reclamation idea was originated by Dr. Quayle just before the selective military draft was put into effect last June, and has been widely commented upon. The doctor has studied Germany and German resources from the inside, and is convinced that we need conservation of our manpower.

"It would be a simple matter, in a period varying from one to six months, to reclaim 90 per cent of the men rejected as physically unfit for military service," Dr Quayle says. "When these men are rejected on account of some physical defect, in a great percentage of cases it leaves them in bad mental condition, with a sense of shame for having been rejected, leaving them open to melancholia and pessimism and in such psychic condition that they are not good citizens owing to these influences, to leave at home.

Struggle Behind the Lines

Upon all those who remain at home in this war a very great burden will be imposed. They must provide the sinews of warfare. To do so entails no mean amount of physical effort, let alone mental strain. All of the shock of battle is not borne at the front; much of it must be absorbed behind the fighting line. And as this mostly is an iron and steel war, one of its very greatest problems is the personal element of the iron and steel industry. It is not unlikely that the quantity and quality of metal this personnel is able to relay against the Germans may decide the war.

The war has brought to British industry a clearer appreciation of the element of fatigue. It has been discovered, and the discoveries classified, that the human engine has defined limitations, and that these limitations may not be overstepped if production is to keep pace with the necessities of warfare. We are told that fatigue is a poison. Certainly the weaker are less able to resist it than the strong. Therefore, the industrial worker who is below par physically begins the day with a handicap and ends it with loss to his work and to himself.

It is a matter of general knowledge that many thousands of young men who barely passed physical examinations were very greatly improved by army camp life. Those of them who escape serious wounds will come back after the war better fitted to take up the tasks of peace than ever would have been without the outdoor training they got. Most of them have responded to physical reclamation treatment in much less than Dr. Quayle's six months' maximum.

Of Great Importance Industrially

Then, Dr. Quayle thinks, if it is proven that it is worth while to spend a few months to reclaim a man for military service, why would it not be worth while also to spend a little time and money to reclaim men for the vitally necessary industrial work that must be done to enable the fighting man to fight? The welfare departments of the larger corporations have made a beginning. A further step toward a larger reclamation program is the establishment of summer camps.

Speaking of his military reclamation plan, Dr. Quayle says:

"I have estimated that it would cost not to exceed $100 for each man, and surely when he was reclaimed he would be worth $5000 to the government. This plan is nothing more or less than the plan adopted by some of the greatest corporations in the country: the saving of the by-product."

An almost appalling problem of reclamation will confront the civilized human race after war has run its course. The aftermath of no war that has gone before offers a comparison. Industry will not be blind to the necessity of beginning its solution before the war is over. It used to be said, "In time of peace prepare for war." Now it is being urged, "In time of war prepare for peace." If it is worth $100 now to reclaim a man for a relatively uncertain future, is it not now also worth at least that much per man to reclaim the industrial army, most of whom will have to bear the major portion of the burden of reconstruction?

Women to Remain in the Home

For unless the war runs well into a decade this country will not need to call upon its womanpower to take the place of the manpower to the extent made necessary on the European continent. American women will have to do a great deal of real work; but it does not seem reasonable to expect, especially if the Quale reclamation plan is put into effect, that men in American industry will be largely supplanted by women. At any rate, the immediate problem appears to be conservation of manpower in the United States.

One highly important feature of the Quayle military reclamation plan would seem to recommend itself to industry: Reclamation of men not skilled in industries necessary to war would release them for military service and make it possible for the government to retain at home a great number of industrially skilled men who otherwise would have to take the places at the front of rejected men not essential under existing conditions, to the industrial prosecution of the war.

Four economic points stand out in the military reclamation plan:

"Every man reclaimed would increase the national wealth.

"It would delay calling out another class and in the eyes of the people would justify the second call when necessary.

"It would save the rejected man from himself.

"It would give the United States an army of from 500,000 to 1,000,000

men from among rejected men within four months."

Undoubtedly a great proportion of industrial workers in the United States are below par in effectiveness in proportion to their physical incapacities. It has been found, too, that physical deficiency produces mental deficiency in skilled and brain workers. Also, the strain of overwork in the production of war materials has left its mark on American labor, especially skilled labor. The reclamation idea would seem to open a broad field for the industrial welfare worker.

Many of the larger corporations, at least, already have sufficient idle acreage on which they could establish reclamation camps. Some of these companies are planning summer recreation camps. Reclamation work need not be confined to the summer months. Much of the best work for the physical improvement of the American soldier was done in the more or less raw weather of the autumn.

With its welfare and recreation work the iron and steel industry has already made a start toward real reclamation work. Intensive application of methods already begun will do much toward placing the American industrial army on a physical footing comparable to that of the military forces of the United States.

No Curtailment

Of Motor Car Industry to be Forced —Builders Hold Meeting

Detroit, Dec. 3.—Motor car manufacturers, representing $800,000,000 of invested capital, have offered their entire facilities to the government as a war aid without reservations of any kind. The action followed a conference of 150 producers in the Detroit Athletic club, Nov. 30, which was called by the National Automobile Chamber of Commerce to consider new conditions confronting the industry due to the war and its attendant problems of transportation, labor, raw materials supply, taxation and government regulations.

The following resolution was sent to Daniel Willard, chairman of the war industries board:

The automobile industry, as represented by more than 150 manufacturers in session here today, volunteers its hearty support to our automobile industries committee in Washington and pledges to the war industries board and the war and navy departments their full co-operation, and to a man express willingness to turn their facilities over to the government as soon as the government can make use of them.

In the meantime we hope to keep our organizations intact so as to conserve the greatest possible potential strength to the present and future war plans of the government.

Assurance was given that the government does not intend to enforce any curtailment in the manufacture of motor cars to create added capacity for the manufacture of war materials. A letter from the priority shipping board, read at the meeting by Hugh Chalmers, member of the motor car committee of the war industries board, stated that there is no intention to restrict the use of freight cars by the motor industry.

It has been found that much of the contemplated expansion in the motor industry has been retarded by the prevailing uncertainties, but the assurances given at the conference removed all these obstacles and established a ground on which manufacturers can plan future operations.

Alfred Reeves, general manager of the chamber, submitted a report for the year ending June 30, showing that production for the year was 1,806,194 motor vehicles, of which 112,200 were trucks, the total value of both being $917,470,938.

Doing business in the United States were 230 makers of passenger automobiles and 372 makers of motor trucks in 32 states, with a capital investment of $736,000,000 and with 280,000 workers to whom $275,000,000 is paid annually in salaries.

It was shown that 1080 manufacturers of bodies, parts and accessories have a capital of $336,000,000, employ 320,000 workers and pay $288,000,000 annually in salaries.

There are 27,800 automobile dealers and 25,500 garages in the United States, and all dependent on the production of motor cars. They represent a capital investment of $184,000,000 and employ 230,000 people.

Exports for the year ending June 30 were 64,834 passenger cars and 15,977 trucks. The value of these outgoing consignments, including tires and parts, was $133,411,000.

To Make Auto Parts

The G. F. Mitchell & Son Co., Cleveland, sheet metal worker, has plans in preparation for a 2-story plant to cost about $165,000. Upon the completion of the new plant, which is to be 300 x 300 feet in size, of brick and steel construction, with saw-tooth roof, the company is to begin the production of automobile brake drums and automobile parts of a similar nature. For some time past a specialty has been made of battery boxes, hoods and other kinds of sheet metal work associated with automobile manufacture. Although the company has no government contracts at the present time, it has been actively engaged in the manufacture of airplane fittings, cowls, hoods, tanks and other accessories for both airplanes and motor trucks. Additional business has made necessary the immediate construction of temporary additions pending the completion of the main plant.

Reclaimed Metals Increase Heavily in Valuation

An increase of $151,072,826 in the value of secondary metals, exclusive of iron, steel, platinum, gold, silver and ferroalloys, is shown in the geological survey's report for 1916, the total being $265,377,856. The increase was due partly to large use of reclaimed metal and partly to much higher average prices. The report stated that it is difficult to estimate the value of ferrous scrap remelted in 1916. Some of the scrap ferrous contained nickel, tungsten, manganese and other alloys, which made it many times more valuable than the more ordinary commercial products. Prices for iron and steel scrap, nevertheless, increased to record figures.

Secondary copper, including that in alloys other than brass, aggregated 140,000 short tons, and was valued at $68,880,000; remelted brass, 300,000 short tons, $127,440,000; secondary lead and lead in alloys, 86,300 short tons, $13,289,400; secondary spelter and recovered zinc in alloys other than brass, 53,300 short tons, $14,284,400; tin, 17,400 short tons, $15,131,040; secondary antimony and recovered antimony in alloys, 4480 short tons, $2,270,016; secondary aluminum and recovered aluminum in alloys, 19,300 short tons, $23,430,200; and secondary nickel and recovered nickel in alloys, 816 short tons, $652,800. The nickel statistics are based on recoveries made by the International Nickel Co.

Reconstructing Big Plant

Work on the second unit of the reconstruction scheme undertaken early this year by the Cutler-Hammer Mfg. Co., Milwaukee, manufacturing electric controlling devices, magnetic gearshifts, etc., will start Oct. 1. As previously announced, the entire plant will be replaced with a series of modern reinforced concrete and steel factory buildings, each 50 x 200 feet in size and seven stories high. Equipment is now being installed in the first building, which will be ready on Oct. 1. From five to six similar units will be erected during the coming two years.

Shell Steel Specifications Issued

Ordnance Department Furnishes Manufacturers With Complete Code of Chemical and Physical Requirements for Billets and Bars Which Are to be Converted into Munitions for American Army and Navy

MANY tons of steel bars and billets are being made into shells at various plants throughout the country. To avoid all unnecessary delay and to have all mills producing shell steel on a standard basis, the ordnance department has issued the following specifications:

1.—*Material*

The steel shall be made or finished by the acid, or basic open-hearth, or by the electric furnace method.

2.—*Molds*

In every case molds should be of approved design, preferably with thick walls at the bottom and thin walls at the top. The appliances and methods must be such as to insure satisfactory cooling and setting from the bottom toward the top. It is strongly recommended that ingots be cast by the indirect multiple method with large end up and with hot top of at least 15 per cent of the weight of the ingot. The cross sectional area of the ingot will be at least four times the area of the bar to be rolled for projectiles up to include 8 inches. For larger calibers it shall be at least three times the area.

3.—*Discard*

(a) Sufficient discard shall be made from the top of the ingot to secure freedom from piping, excessive segregation or other injurious defects. Sufficient discard shall be made from the bottom of the ingot to insure sound and uniform metal. In no case shall the discard from the top of the ingot be less than 25 per cent of the weight of the ingot except by authority of the head of the inspection section. No reduction in the amount of discard will be considered by him until the maker has given satisfactory proof, through special inspection of the discards of a considerable number of heats, made upon application of the maker, that a new figure should be prescribed.

In case the practice at any plant shows that the adopted percentage of discard is not sufficient to remove practically all the piping, porosity and other injurious defects from the milled product, a new higher percentage of discard shall be adopted to secure this result.

(b) A cold fracture test for each ingot shall be made on the bar or billet as rolled or forged at a point immediately below the discard. The fracture must be made in the condition of a fresh surface not less than one-sixth of the area to be examined; and must be centrally located. If any piping, segregation, or other injurious defects are revealed, discard shall be continued until the fracture discloses satisfactory material. A fracture test for secondary piping may be made on the rolled or forged bar at such places as the inspector may designate, such fracture to be made at the nearest unit. In every case, should the first fracture test reveal piping or other injurious defects, discard shall be continued unit by unit until the inspector is satisfied as to the soundness of the material which has been accepted for use.

Table I

Class "A" Steel

	Column I desired composition	Column II limiting composition
C	0.40	0.35–0.50
Mn	0.65	0.50–0.80
P	0.04*	0.05*
S	0.045*	0.06*
Si	0.20	0.10–0.30

*Not over.

4.—*Surface Defects*

Surface defects which as determined by spot chipping are found to be not deeper than .015 per inch of billet diameter need not be removed. Deeper defects shall be removed by chipping, provided the depth of the chipping does not exceed 1/6 inch for each inch of diameter, thickness or diagonal on which the chipping is done. The width at the top of the chipping shall be at least four times the depth.

Table II

Class "B" Steel

	Column I desired composition	Column II acceptable limits	Column III permissible limits
C	0.55	0.50–0.60	0.45–0.65
Mn	0.70	0.60–0.80	0.50–0.90
P	{ 0.04	{ 0.05	0.07
S	{ 0.045	{ 0.05	0.06
Si	0.20	0.15–0.25	0.10–0.35

5.—*Chemical Requirements*

Class "A" steel is intended for use in the manufacture of shells which require heat treatment. Its chemical requirements are shown by check analysis in Table I.

Class "A" steel with any element falling outside the limits given in column II shall not be accepted for use in the manufacture of shells which require heat treatment.

Class "B" steel is intended for use in the manufacture of shells which do not require heat treatment. Its chemical requirements are shown by check analysis in Table II.

Class "C" steel is intended for use in the manufacture of shrapnel cases. Its chemical requirements are shown by check analysis in Table III.

Class "B" steel and class "C" steel within the limits given in column II will be accepted subject to physical test. If any element falls outside the limits specified in column III, the steel shall be rejected. Steel coming between the limits of columns II and III may be accepted at the discretion of the inspector. The governing principles are that steel will be accepted if within the limits of column III only when the hardening elements occur in such proportions as to give approximately the average properties desired, but that steels shall be rejected which fall between the limits of columns II and III where the hardening elements are chiefly in one direction.

The manufacturer shall submit certified analyses, one taken from drillings secured from bars or test ingots from the first 20 per cent of the pour and one similarly obtained from the last 20 per cent of the pour. In addition, a check analysis shall be made from drillings taken from a bar or forging from some one of the bars of each heat as rolled or forged. It must be secured from a point midway between the center and outside and immediately below the discard. If the contractor so desires, the check analysis may be made from drillings or turnings taken from one of the tensile test specimens when these are secured from immediately below the discard.

If upon analysis there shall be found elements other than those enumerated previously, and if the quantities present are greater than the following percentages, the steel may, in the discretion of the inspector, be rejected.

Nickel	0.50 per cent
Copper	0.25 per cent
Chromium	0.30 per cent

Other elements will be given special

consideration. The manufacturer shall not introduce into the composition of the steel any of the above or other special ingredients such as aluminum, titanium, cobalt, etc., without information having been previously given to the inspector. Aluminum shall usually be added in the ladle and in no case shall a greater amount be added than 4 ounces per ton of steel.

6.—*Classification of Heats*

To facilitate control of subsequent heat treatment and machining, steel shall be divided into two grades, depending upon the chemical composition. Each bar or billet of each heat shall be plainly marked to indicate its class and grade. Grade 1 of each class shall consist of all heats in which the combination of the hardening elements is such as to give steel on the soft side of the mean of column II. Such steel shall be designated as class A-1, B-1, or C-1 steel. Grade 2 will consist of the remainder of the accepted steel, that is the steel on the hard side of the mean of column II, and will be designated as class A-2, B-2, or C-2 steel.

7.—*Marking*

Each piece shall be legibly marked by the manufacturer to indicate the class of steel as specified above, its heat number and the plant at which manufactured. In addition, until the fracture test has been made, each piece shall be suitably marked to indicate the ingot number in each heat and also the top cut of each ingot.

Finally accepted material must bear the inspector's stamp.

8.—*Physical Requirements*

When billets or bars are cropped for fracture, sufficient material shall be taken from two ingots for test either just above or just below the point of fracture, at the option of the manufacturer. This material shall be rolled or forged to round or square test bars with cross sectional area of not less than 2 square inches.

Class "A" steel shall be tested as follows: The two test bars shall be annealed by heating to a temperature between 800 and 900 degrees Cent. and holding at this temperature for approximately 30 minutes and then slowly cooling. A standard 2 x 0.505-inch test specimen cut from each of the two bars shall be tested and must meet the following physical requirements:

Tensile strength not less than 70,000 pounds per square inch.

Elastic limit not less than 35,000 pounds per square inch.

Elongation in 2 inches not less than 21 per cent.

Portions of the two annealed bars shall be heated to a temperature between 775 and 875 degrees Cent. and held at that temperature for approximately 30 minutes, then quenched in water at 15 to 35 degrees Cent. and heated again for approximately 30 minutes at a temperature between 500 and 550 degrees Cent. Standard 2 x 0.505-inch test specimen cut from each of the two bars must meet the following physical requirements:

Tensile strength 110,000 to 150,000 pounds per square inch.

Elastic limit not less than 65,000 pounds per square inch.

Elongation in 2 inches not less than 11 per cent.

Class "B" steel shall be tested as follows: The two test bars shall be annealed by heating to a temperature between 800 and 900 degrees Cent. and holding at that temperature for 30 minutes and then slowly cooling. A standard 2 x 0.505-inch test specimen cut fro meach of these bars must meet the following physical requirements:

Tensile strength not less than 90,000 pounds per square inch.

Elastic limit not less than 45,000 pounds per square inch.

Elongation in 2 inches not less than 15 per cent.

Class "C" steel shall be tested as follows: A standard 2 x 0.505-inch test specimen cut from each of the two test bars selected by the inspector shall be heated to the proper temperature, quenched in oil and drawn back if necessary. These test bars must meet the following physical requirements:

Tensile strength 120,000 to 160,000 pounds per square inch.

Elastic limit not less than 85,000 pounds per square inch.

Elongation in 2 inches not less than 12 per cent.

The elastic limit in all cases must be determined not by the drop of the beam, but either by an indicating extensometer or by the Scribe method, as may be specified by the inspector.

Table III

Class "C" Steel

	Column I desired composition	Column II acceptable limits	Column III permissible limits
C	0.50	0.45–0.60	0.45–0.65
Mn	0.70	0.60–0.80	0.50–0.90
P	0.04	0.05	0.05
S	0.045	0.05	0.06
Si	0.20	0.15–0.25	0.10–0.35

9.—*Dimensions of Bars*

The usual sizes of bars or billets to be supplied for the manufacturers of the corresponding types of forgings are specified in the table IV. At the discretion of the production section of the gun division the sizes may be modified to meet the requirements of the various forging makers' equipment. The cross sectional dimensions and weights are subject to a tolerance of plus or minus 2½ per cent.

Bars or billets shall be furnished in multiple units plus an end allowance and cutting allowance as specified below. The end allowance will be the amount that may be necessary to remove unsuitable metal at the ends due to shearing the bars at the steel mill. The cutting allowance shall be ¼ inch for each unit for bars up to and including 6 inches, and be ⅜ inch for each unit for bars above 6 inches.

The weights of blanks specified in Table IV are believed to be in some cases materially greater than is actually necessary, especially when forgings are made from class "B" steel, thus obviating the need for a machining cut after heat treatment. The weights will be revised as soon as sufficient data shall have been accumulated.

10.—*Retest*

If the results obtained from one of the test bars in each of the tests prescribed above do not meet the physical requirements, or if specimens break outside the middle third of the gaged

(*Concluded on page* 1227)

Table IV

Sizes of Bars and Billets for Corresponding Types of Forgings

Caliber and type	Weight of blank Type A forg., lbs.	Weight of blank Type B forg., lbs.	Rounds, diameter, in.	Squares. Side, in.	Squares. Diagonal, in.	Corner. Corner radius, in.	Gothic. Diagonal, in.
3-inch shell, Mod. 1917	....	21.5	3.125	....	.....	...	.....
3-inch shrapnel, Mod. 1915	....	19.0	3.125	....	.....	...	.....
75 mm. shell, Mark I	20.6	21.85	3.125	....	.....	...	.....
75 mm. shrapnel, Mark I	15.9	17.0	3.125	....	.....	...	.....
3.8-inch shrapnel	27.0	31.0	4.5	3.75	4.5	1.5	4.5
4.7-inch shell Mark I	67.3	74.0	5.875	5.0	5.875	1.5	5.875
4.7-inch shrapnel	50.5	55.6	5.875	5.0	5.875	1.5	5.875
5-inch shell, Mark II	80.9	87.4	6.0	5.125	6.0	1.75	6.0
6-inch shell, Mark I and II	141.6	152.7	7.0625	6.25	7.0625	1.75	7.0625
155 mm. shell, Mark I	155.5	167.0	7.0625	6.25	7.0625	1.75	7.0625
8-inch shell, Mark I	302.0	319.3	9.0	6.95	9.0	1.0	9.0
9.5-inch shell, Mark I	503.7	528.4	11.0	8.657	11.0	1.5	11.0
10-inch shell, Mark II	660.0	690.4	11.5	9.303	11.5	2.0	11.5

War Contracts Unloose Tool Orders

Crane and Machine Tool Markets Experience Unprecedented Buying Movement Following Lettings of Government Contracts—Shipbuilders, Shellmakers, Gunmakers and Airplane Builders Vie With One Another for Equipment

AS MORE than 95 per cent of the machine tools now being turned out are for use directly in connection with the war, a review of the machinery markets for November resolves itself into a discussion of government contracts and orders emanating therefrom. Included under the classification "war work" come the machinery requirements of certain railroads. Such needs receive a priority rating which makes them rank well up with the requirements of the cargo shipbuilders, which are subordinated, in turn, only to equipment needs of destroyer builders, ordnance makers and airplane engine builders. There has been some talk of placing destroyer work under a special AA priority certificate, so numerous and pressing have been the various demands accompanied by A1 certificates. The pressure has been so great that several machine tool builders are undertaking plant extensions. It has been suggested that the government give financial assistance to machine tool builders to assist the building of additions, just as it aids manufacturers of ordnance and other munitions.

Large Shell Contracts are Awarded

Many shell contracts were placed by the government in November and these were reflected extensively in the machine tool market, despite the fact that many plants had been well equipped previously for allied orders. The Scovill Mfg. Co., Waterbury, Conn., placed several orders against a fuse contract, including one for 300 hand screw machines. The International Arms & Fuse Corp., Bloomfield, N. J., received an order for 6-inch shells and purchased about 500 machine tools, mostly lathes. The Baldwin Locomotive Works added a few tools to its shell-working equipment. The North American Motors Corp., Pottstown, Pa., ordered about $90,000 worth of tools to make 6-inch shells. The Edwards Valve & Mfg. Co., Chicago, bought about $130,000 worth of tools. The Davis Sewing Machine Co., Dayton, O., inquired in the Cleveland market for about 40 machines for shell work. The Worthington Pump & Machinery Corp., Hazleton, Pa., issued a large inquiry for equipment to make 75-millimeter shells. The Bartlett & Hayward Co., Baltimore, purchased several hundred thousand dollars worth of equipment against shell contracts. The Twin City Forge & Foundry Co., Stillwater, Minn., obtained a $3,000,000 contract for 6-inch shells. The American Clay Machinery Co., Bucyrus, O., bought 50 21-inch lathes and prepared to equip a new unit to make 6-inch shells. Other companies receiving shell orders were the Symington-Anderson Co., New York Air Brake Co., General Electric Co., Victor Talking Machine Co. and Minneapolis Steel & Machinery Co. The Crucible Steel Co. of America received a contract for 150,000 6-inch shell forgings from the British government and authorized construction of three large buildings at Harrison, N. J.

Further government contracts for ordnance and gun parts were placed during the month, finding immediate reflection in the machine tool market. Dodge Bros., Detroit, received a $30,000,000 contract for 155-millimeter hydro-pneumatic recoil slides and issued several inquiries for tools, including one for 250 milling machines. The Himoff Machine Co., Astoria, L. I., bought additional tools for gun-mount work. The Four Lakes Ordnance Co., formed at Madison, Wis., to make 5-inch guns, purchased about $300,000 worth of tools. The Standard Steel Works Co. negotiated for cranes for its gun-machining shop at Burnham, Pa.

Cargo Shipbuilders Place Big Crane Orders

Among the cargo shipbuilders, the American International Shipbuilding Corp. and the Submarine Boat Corp. figured most prominently in November. The American International closed for seven 10-ton electric traveling cranes, 46 3-ton jib cranes, a similar number of monorail hoists, and about 35 tools for its plate and angle shop. The Submarine Boat Corp. closed for nine locomotive cranes. The Federal Shipbuilding Co. issued a second list of 10 shop cranes for its yard near Newark, N. J., making a total of 20 electric traveling cranes this company had pending as the month closed. In connection with the government's destroyer program, a total of about 65 electric traveling cranes were purchased for the new submarine destroyer shops of the Fore River Shipbuilding Corp., together with about 32 electric hoists. The Newport News Shipbuilding & Dry Dock Co. bought about $5,000,000 worth of equipment for its part of the government's destroyer program. The Wellman-Seaver-Morgan Co., Cleveland, was awarded a contract for condensors and stacks for destroyers; also a contract for steering engines, the two contracts being said to aggregate $5,000,000. The Falk Co., Milwaukee, received a contract for 182 sets of turbine drives for destroyers and planned to build an $800,000 plant extension. The Worthington Pump & Machinery Corp. received a contract for pumping equipment for 150 destroyers, to be built at its East Cambridge, Pa., works, and closed for 39 small cranes. The New York Shipbuilding Co. closed for two locomotive cranes for its Camden, N. J., yard. Government purchases for the Rock Island, Ill., arsenal aggregated $1,000,000.

Airplane Motor Contracts are Placed

The aircraft production board released contracts for many more Liberty motors and also for standard British and French airplane engines. The Simplex Automobile Co., New Brunswick, N. J., bought about $300,000 worth of tools and started making Hispano-Suiza motors. The Lincoln Motors Co., Detroit, bought lathes, radial drills and other tools for airplane engine work. The Ford Motor Co. was reported to have received an order for 5000 Liberty motors. The F. B. Stearns Co., Cleveland, inquired for 25 to 50 machines for airplane engine-building. The Rutenber Motor Co., Marion, Ind., bought tools for work on Renault motors. The Standard Aero Corp., Elizabethport, N. J., bought equipment. The Nordyke & Marmon Co., Indianapolis, bought turret lathes for airplane engine work.

Given Advance

Fore River Empoyes Given Raise—Other New England Strikes

More than 700 employes, about 400 of whom are machinists, of the Fore River Shipbuilding Corp., Quincy, Mass., will receive raises in pay, dating back to Nov. 5, according to awards made by Henry B. Endicott, Boston, of the Massachusetts Public Safety Committee. Practically all the men will be put on the same footing as the employes in the United States navy yard, Charlestown, Mass. The arbitrator says there is no such distinct classification at the plant as bolters and reamers, they being classified as drillers. He says the wages of the crane men are right and are to remain undisturbed. As to the machinists, he says: "If the Fore River men rise to the navy yard standards a considerable proportion of all machinists will be advanced in rating in 30 days or less, but as this all depends on the men themselves I can only establish the standard. The company must and doubtless will apply the principles in good faith."

Settlement of the strike of 200 employes at the plant of the American & British Mfg. Co., Providence, R. I., recently was effected. The terms of the settlement were not reported by John J. Casey, conciliator of the department of labor, Washington, but it is believed the workers were granted the 8-hour work day for which they were striking. The company is making anti-aircraft guns for the government.

About 30 union molders and coremakers, employed by the Connecticut Electric Steel Co., Hartford, Conn., are out on strike, and demand the reinstatement of two molders who were discharged several weeks ago. The plant is making castings for the ordnance department of the army and the strike is tieing up the output.

Employers of New England to Talk War Problems

A conference on war problems in the textile industry is announced for Jan. 18 in the Copley-Plaza hotel, Boston, under the auspices of the committee on social welfare of the National Association of Cotton Manufacturers. New England manufacturers of all industries, however, will be invited to participate in the meeting. The principal speaker will be Dr. Frederick Cotton, who is to have charge of the Elks' base hospital in Boston for refitting crippled soldiers for industrial usefulness. He will talk on "Fitting the Crippled Soldier for Self Support". Bernard J. Rothwell, chairman of the Massachusetts state immigration board, will speak on "Immigration and Labor Conditions After the War", and Dudley M. Holman, formerly of the Massachusetts state industrial accident board, will speak on "Health and Safety in Industry". The conference will close with a banquet, the principal speaker at which is expected to be Theodore Roosevelt.

Board Fixes Wage Scales for Shipyards

In the first decision to be handed down by the United States Shipbuilding Labor Adjustment Board, uniform minimum wage scales were set for the Pacific coast shipbuilding yards, which will be regarded as a guide for shipyards throughout the country. The decision effects an increase of 10 to 30 per cent over the old scale, prevailing in the west, although its uniformity makes it lower in some localities than the temporary scale now in force. The board, in its decision, declares that employes' discrimination, interfering with defense of the nation in time of war, would be intolerable.

Women Are Registered

Registration of women for industrial service has closed in New Haven, Conn., with more than 15,000 registrants for that city and its immediate suburbs. From a list of more than 50 branches of service, munition makers will obtain help to fill places of men drafted into military service. Because of housing problems no encouragement will be given women elsewhere to come to New Haven. Registration in other Connecticut cities and towns will begin shortly that each may have its own list of availables.

Interest Shown in Butte Manganese Deposits

Mining of manganese ore in the Butte, Mont., district has been given considerable attention since the first of this year, according to a report just issued by the geological survey. The development of manganese ores prior to 1917 had been wholly incidental to the production of silver, zinc and lead, in the ores of which manganese minerals are among the chief components of the gangue. As ores containing less than 25 per cent silica are rare, the development of the lodes for manganese had lagged. Recently, however, a systematic exploration of several of the larger manganiferous lodes has been begun. Most of the ore is oxidized and siliceous, but there are small quantities of high grade ore, both oxide and carbonate.

Partial estimates of the manganese oxide ore in the Butte district are summarized as follows: High grade ore, low silica, 1000 tons; high grade ore, siliceous, 1600 tons; siliceous ore with 20 to 37 per cent manganese, 130,000 tons; and siliceous ore, with 10 to 18 per cent manganese, 270,000 tons. The main problems to be solved before Butte can become a factor in the manganese market under present conditions are (1) successful milling of the ores to produce a low-silica concentrate, and (2) briquetting the concentrates or otherwise making it acceptable to buyers. Milling tests have already been begun but the results have not been entirely satisfactory, owing chiefly to losses in the tailings by sliming.

Court Prohibits Strike

Judge Christopher T. Callahan of the Superior court of Massachusetts has issued an injunction restraining the two Springfield, Mass., branches of the International Association of Machinists from carrying on the strike or from otherwise interfering with the business of the Baush Machine Tool Co., of that city. The order of the court prohibits striking until the defendants renounce such intention. Leaders of the unions state that the strike will be resumed on other issues, as the court's order does not prevent a strike for an improvement in working conditions.

To Build Naval School

Announcement is made by the Massachusetts Institute of Technology, Cambridge, Mass., that work will be started at once on the construction of the Pratt school of naval architecture and marine engineering, the funds for which were provided in the will of Charles Herbert Pratt, a Boston lawyer, who died in 1912. The bequest amounts to $750,000. Because of the high cost of materials, it has been thought best to defer the erection of the building until later. The urgent need for naval draftsmen and architects and the belief that the demand may continue for some time, however, convinced the officials it would be a service to the country to establish the school as soon as possible.

The Rowe Motor Mfg. Co., Dawnington, Pa., has purchased 4 acres at Lancaster, Pa., and will move its plant there.

Heavy Demand

For Refractories Keeps Makers Hard Pressed—Car Supply Unsatisfactory

Pittsburgh, Dec. 3.—Demand for first quality fire clay and silica brick is coming to refractory interests in increasing volume. A considerable portion of this demand is being made by consumers of producers with whom they have never dealt previously. Makers are able only to serve their regular customers, and while they are fairly successful in making the required deliveries, they are not entirely so. Embargoes on the Pennsylvania railroad are proving a source of unusual annoyance to makers in the Pennsylvania district, and unless they receive additional supplies of coal soon a number of them will have to close down their plants.

The steel interests are being supplied with their refractories requirements in a satisfactory manner, considering the handicaps that producers are laboring under. It is hoped that the fuel shortage situation will be remedied, or at least relieved greatly soon, and in the event this comes about, makers of refractories will be in much better position to take care of their customers.

Refractories interests still are being forced to contend with a shortage of cars for the transportation of their products. Notwithstanding efforts which have been made to bring about an improvement in the situation, little betterment has been observed. One maker reports that the car shortage has made it necessary to stack approximately 750,000 brick of first and second quality. This maker reports that conditions are such that during the past two weeks only seven cars have been received at the plant for loading, where ordinarily 120 would be required during the same period. This is less than 6 per cent of the number usually required. The shortage is especially in evidence in northern Ohio; southern Ohio, it is reported, is affording better transportation facilities.

Refractories

(Per 1000 f. o. b. works.)

FIRE CLAY BRICK.

(First Quality.)

Pennsylvania	$45.00 to 55.00
Missouri-Illinois	55.00 to 65.00
Ohio	45.00 to 50.00
Kentucky	45.00 to 55.00
New England	55.00 to 65.00

FIRE CLAY BRICK.

(Second Quality.)

Pennsylvania	$40.00 to 50.00
Ohio	37.00 to 40.00
New England	48.00 to 58.00

SILICA BRICK.

Pennsylvania	$50.00 to 60.00
Chicago	55.50 to 65.50
Birmingham	45.00 to 55.00

MAGNESIA BRICK.

(Per Net Ton.)

9 x 4½ x 2½	$135.00 to 160.00

CHROME BRICK.

(Per Net Ton.)

9 x 4½ x 2½	$135.00 to 140.00

BAUXITE BRICK.

(Per Net Ton.)

55 per cent	$40.00 base
76 per cent	100.00 base

Iron Mining

In Newfoundland Stimulated by Munition Making

Toronto, Dec. 3.—The renewed activity of the munitions industry has given a great impetus to iron mining in Newfoundland, from which the Dominion Steel Corp. and the Nova Scotia Steel & Coal Co. draw large supplies of ore. Recruiting for the army is largely depleting the supply of labor and the companies are finding some difficulty in obtaining men. A number of the fishermen having completed their work for the season are obtaining employment at the mines.

The Dominion Bridge Co. of Montreal and Toronto, has received an additional order for 10,000 tons of fabricated steel from the American International Corp., which with previous orders from the same source makes a total of 50,000 tons. This will require the entire capacity of the Toronto and Montreal plants for 10 months.

Tributes Are Paid

Tributes were paid to the late Frank H. Zimmers Nov. 19 at the regular monthly meeting of the Pittsburgh Foundrymen's association, of which Mr. Zimmers had been secretary since its inception in 1896. A memorial resolution lamenting his death, which occurred unexpectedly a few weeks ago, was adopted. Brief remarks were made by Lewis A. Way, B. D. Fuller, W. J. Brandt, William Yagle, C. H. Gale, E. D. Frohman, Maj. J. B. Speer and others, all of whom spoke about the active part Mr. Zimmers took in the affairs of the organization. Letters of condolence were read from the Philadelphia Foundrymen's association and Dr. Richard Moldenke. Following the dinner, Mr. Fuller, superintendent of the foundry of the Westinghouse Electric & Mfg. Co., at Cleveland, and recently elected president of the American Foundrymen's association, presented an interesting paper describing the growth and development of the industry.

Maintain Output

In Coal Tar Products Despite Obstacles—Toluol is Accumulating

New York, Dec. 1.—Although difficulty in securing coal and the congested condition of the railroads continue to hinder coal tar products manufacturers in filling contracts, no really serious situation yet has developed. Since the output of coal tar products at present is of much importance to the country's welfare, urgent efforts are being made to keep it from falling behind. With the exception of toluol, of which the output at no time has been as large as government requirements of trinitrotoluol could absorb, the output is abreast of requirements.

Numerous consumers of benzol came into the market this week and renewed contracts for next year. Some of the contracts cover the first half of 1918, while others call for deliveries throughout the year. Large quantities were involved. This business was transacted at 45 to 46 cents per gallon for moderate requirements. On larger contracts, lower was done. One or two exceedingly large sales as low as 40 cents was done.

That toluol output no longer is as far behind the government requirements as was the case only a few months ago, is indicated by the fairly large quantities of this product which have accumulated during the past week or 10 days at producers' plants. This accumulation is due to the lack of government shipping instructions.

Due mainly to the activities of Japanese buyers, the output of phenol now is practically sold up through the first quarter of 1918. The market remains at 50 to 52 cents per pound. Some small spot sales were made higher this week.

Coke Oven By-Products

Spot

Per Gallon at Producers Plant

Pure benzol	$0.44 to .46
Toluol	1.70 to 1.80
Solvent naphtha	.19 to .22

Per Pound at Producers Plant.

Phenol	$0.50 to .52

Per 100 Pounds at Seaboard

Sulphate of ammonia	$4.90 to 5.00

Contract

Per Gallon at Producers Plant

Pure benzol	$0.44 to .46
Toluol	nominal
Solvent naphtha	.19 to .22

Per Pound at Producers Plant

Phenol (nominal)	$0.50 to .52

Per 100 Pounds at Seaboard

Sulphate of ammonia	nominal

Adding New Mills

In order to increase its production to meet the unusually heavy demand from automobile manufacturers, the Michigan Copper & Brass Rolling Mills, Detroit, is building an addition to its plant which will complete a unit 1000 x 160 feet. The new building is of brick and steel construction similar to the other structures of the company and will be completed about Dec. 15. It is hoped by this new unit to bring the production of the company up to 1,000,000 pounds of thin brass and copper per month. To facilitate this production the plant will be equipped with machinery of improved type provided with every device for the protection of employes. That it may better serve the special needs of its customers, the company is adding a laboratory for extensive research work in testing and in chemical analysis. In the interests of its employes the company is establishing a doctor's office and emergency hospital, a welfare department and lunch rooms. A plan of landscape gardening to beautify the grounds also is being worked out. Alonzo P. Ewing, general manager of the company, states there are orders on the books for thin brass for three months in advance and that renewed activity in the automobile trade already is being reflected in the company's accounts.

Tata Iron and Steel Will Push Extensions

An expansion program, involving several million dollars, which has been started by the Tata Iron & Steel Co., of Sakchi, India, is to be put through without delay. According to present plans, three blast furnaces, a 150-ton by-product coke plant, a plate mill and other units will be erected. H. G. Lee, representative of the Tata company, now in Youngstown, O., inspecting work being done for his company by the William B. Pollock Co., of that city, said it was due to the unusually stable labor conditions in India that so large an expenditure was being made at this time. Unskilled Indian labor is available in quantity at 10 to 12 cents a day, while natives somewhat adept at skilled work command about 50 cents and are fairly efficient. Unusually low cost of living in India makes these wages fairly rumerative, it is said.

To Build Shell Plant

Negotiations have been completed between the chamber of commerce of Batavia, N. Y., and a Canadian interest for the establishment of a shell factory in that city. The Canadian company, which has secured a contract from the United States government for shells, plans to have the new plant operating about January, 1918.

Equipping Gun Plant

The Marlin-Rockwell Arms Corp., New Haven, Conn., unable to build a new plant soon enough to meet its needs, will remodel part of the Mayo radiator factory and, beginning about Dec. 1, install machinery therein for the making of rapid-fire guns. The corporation recently purchased the entire Mayo plant and 12 acres of land adjoining it. It will continue to devote one-half of the plant to making radiators.

Merge Boat Works

The Racine Boat Co., Racine, Wis., and the Simmons Boat Co., Irving Park, Chicago, which have recently taken government contracts for power boats of various kinds for Atlantic service, have effected a merger. The Racine company will handle all contracts for power boats under 50 feet and the Chicago yard will specialize in boats up to 130 feet. Fred W. Herman continues as president of the Racine Boat Co., but C. M. Godsko retires at vice president and is succeed by Ned Simmons, Chicago, who is a naval architect of wide note and will be in general charge of the design and production of both concerns.

Receives Rifle Order

The Remington Arms Co., Bridgeport, Conn., has received an additional order to its large Russian contract of 200,000 rifles and 160,000 extra barrels and receivers. The company is at present turning out about 100,000 rifles a month and 10,000 bayonets a day. It is getting ready to make the Browning machine gun, patented by the Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.

Increases Ferro Output

The Southern Manganese Co., Anniston, Ala., in the next few days will have ready for operation two additional electric furnaces for the production of ferromanganese. The company is headed by Theodore Swann, formerly with the Alabama Power Co.

The Duplex Metallic Co. has placed in operation a new automatic furnace at its plant in Conshohocken, Pa.

Shell Specifications

(*Concluded from page* 1223)

lengths, two additional test specimens shall be taken for each one that failed. All the replacing specimens must succeed to pass the lot of steel, except that further replacing specimens may be taken to represent any which break outside the middle third and fail in elongation only.

If the chemical or physical requirements are not met, an additional top discard of at least 10 per cent may be made at the request of the manufacturer, provided the position of the bars or blooms of each ingot can be determined. The heat may then be resubmitted for test. The above prescribed tests will be made as if the additional discard were part of the original discard. When the identification of the blooms is not maintained and the blooms have not been cut into bars, the 10 per cent minimum discard shall be made on the part of each bloom corresponding to the top of the ingot.

11.—*Test Reports*

A report covering the chemical composition, physical tests and details of heat treatment employed for each melt shall be furnished by the manufacturer to serve as a guide for the consignee in heat treating the product.

12.—*Inspection and Testing*

Inspectors and other duly accredited representatives of the government shall have free entry at all times to all parts of the manufacturer's plant which concern the manufacture of the material ordered. The manufacturer shall afford the government representatives all reasonable facilities free of cost to satisfy them that the material is being furnished in accordance with these specifications. Tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works. The manufacturer shall provide within his plant a suitable furnished office for records, drawings, books, etc., to be used exclusively by the government representatives.

13.—*Acceptance of Steel*

Material shall be inspected and tested in heat lots for acceptance before leaving the steel maker's plant. Such inspection and testing shall be final except where injurious defects, due to material or to the steel maker's workmanship, are subsequently disclosed which could not be readily determined at the time of its acceptance. The steel maker shall be responsible to the extent of replacing at the forging plant, in the form originally furnished, any steel so found to be properly rejected,

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

LEROY F. HAMILTON, who has resigned as manager of the advertising and specialty department of the National Tube Co., Pittsburgh, and has taken up his new work as manager of sales promotion with the Walworth Mfg. Co., Boston, was born in Kewanee, Ill., and graduated from the University of Illinois in 1897. Before becoming associated with the National Tube Co., Mr. Hamilton was with the Western Tube Co., of Kewanee, Ill., which was taken over by the National Tube Co. and is now owned by the Walworth company. Mr. Hamilton advanced from the claim department and secretary to the sales manager of the Western Tube Co. and had been with the National Tube Co. since 1908. He was identified with the advertising success of Kewanee union, of Shelby tubing and National pipe, and has been a well known contributor to advertising periodicals and a speaker on advertising subjects. He is a member of the Technical Publicity association of New York and is president of the Pittsburgh Publicity association and also a member of the Association of National Advertising Managers. Several technical advertising men are graduates from the National Tube Co. advertising department, obtaining their training under Mr. Hamilton. They include: W. A. Phillis, advertising manager of the Borden Co., Warren, O.; William J. S. Ritscher, advertising manager, Petroleum Iron Works Co. of Ohio, Sharon, Pa., and G. E. Land, advertising manager of the Blaw-Knox Co., Pittsburgh. W. L. Schaeffer, formerly assistant to Mr. Hamilton, succeeds the latter as manager of the advertising and specialty department of the National Tube Co.

John A. Green has been appointed superintendent of the foundry operated by the Pittsburgh Crucible Steel Co., Midland, Pa.

Paul Wick, assistant manager of sales for the Trumbull Steel Co., Warren, O., has resigned and will enter the navy.

Arthur M. Long, who for several years has been affiliated with the sales department of the Jones & Laughlin Steel Co., at the Chicago office, has resigned and accepted a position in the sales department of the Trumbull Steel Co., Warren, O.

Alvin Whitehead has taken a position with Clark & Harrison, dealers in machinery and equipment, 149 Broadway, New York.

S. Griffith, formerly foundry superintendent of Fairbanks, Morse & Co., Beloit, Wis., now is affiliated with the South Side Foundry & Machine Co., Charleston, W. Va.

W. D. Sayle has been named president of the Cleveland Electric Motor Co., Cleveland. H. B. Bole will be vice president; C. S. Dangler, treasurer; G. E. Markley, assistant treasurer, and C. Dewitt, secretary.

W. S. Watson, long associated with the sales department of the Bogue-Wensley Lead Co., Denver, resigned recently to take a similar position with the Advance Machinery & Supply Co., also of Denver.

A. E. Short has been appointed factory manager and A. T. Grindle foundry superintendent of the plant operated by the Stewart-Warner Speedometer Co., Beloit. Malleable, gray iron, brass and aluminum castings are made in this company's foundry.

H. M. Lane, of H. M. Lane & Co., Detroit, will address the Associated Foundry Foremen of New York and vicinity on "The Production Foundry" at the next meeting of the association to be held Dec. 8 at the Hotel Chelsea, New York.

R. G. Barr, superintendent of the foundry operated by Fairbanks, Morse & Co., Beloit, Wis., is convalescent at the Mayo Bros.' sanitarium, Rochester, Minn., following an operation. Prior to his present connection Mr. Barr was superintendent of the foundry operated by the General Electric Co., Erie, Pa., and the Baldwin Locomotive Works, Philadelphia.

A. E. Carle, formerly in charge of advertising and sales for the Baush Machine Tool Co., Springfield, Mass., has joined the sales engineering department of Manning, Maxwell & Moore, at Chicago. H. A. Daniels will succeed Mr. Carle at the Baush company.

James Lannigan has been appointed superintendent of the plant of the Portage Foundry Co., Akron, O. He formerly was in charge of a foundry operated by the American Malleable Co., Lancaster, N. Y., and later was affiliated with the Frontier Iron Works, Buffalo.

J. F. Adey, until recently superintendent for Stone & Webster in charge of new construction at the plant of the Brier Hill Steel Co., Youngstown, O., has been sent to France to take charge of a portion of the extensive work which the engineering organization will do there for the United States government.

Howard C. Woglom, who recently resigned as superintendent of the Pratt & Whitney Co., Hartford, Conn., after 17 years of service, has been appointed assistant to B. M. W. Hanson, works manager of the Colt's Patent Fire Arms Mfg. Co., in the same city. Mr. Hanson formerly was vice president and works manager of the Pratt & Whitney Co.

Al Pack, vice president of the Hubbard Steel Foundries, East Chicago, Ind., has enlisted in a base hospital unit being organized in Milwaukee and soon will depart for France. Mr. Pack already has contributed a motor ambulance, two three-ton motor trucks, a touring car and a yacht to the government.

J. W. White, who formerly was associated with the Pittsburgh office of the Westinghouse Electric & Mfg. Co., and later was with the Allis-Chalmers Mfg. Co., has returned to the Westinghouse company, having accepted a position as manager of the power and railway division of the Detroit office of the company.

Charles O. Stumpf has taken charge of advertising in the general offices of the W. F. Davis Machine Tool Co., 149 Broadway, New York. Mr. Stumpf formerly was in the Cleveland office of the Davis company and previous to joining that organization conducted a business of his own under the name of the Reliance Machine Tool Co., Cleveland. He also at one time held an executive position with the Clark Machinery Co., Cleveland.

Men of Machinery Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

CHARLES L. TOLLES, since 1911 vice president and sales manager of the Jewell Belting Co., Hartford, Conn., has been elected president to fill the vacancy caused by the death of Charles E. Newton. Mr. Tolles has been with the company since 1884. James C. Gray, manager of the Chicago branch and Arthur G. Newton, Detroit, son of Charles E. Newton, have been elected directors, succeeding Lyman B. Jewell and Charles E. Newton, former presidents. Harold E. Hitchcock, Connecticut representative since 1902, has been elected assistant secretary of the company.

E. J. Renshaw has been chosen general manager of the Nicetown Plate Washer Co., Philadelphia.

G. H. Sheuberger has been made works and safety engineer for the Goulds Mfg. Co., Seneca Falls, N. Y.

Robert F. Herrick, Boston, president of the Reed-Prentice Co., Worcester, Mass., has been appointed state director for Massachusetts of the war savings committee.

F. D. Walden has resigned as superintendent of the Giddings & Lewis Mfg. Co., Fond du Lac, Wis., maker of lathes and other machine tools and machinery.

Charles W. Schenk, who organized the Schenk Machine Co., Milwaukee, several years ago, has disposed of his interest in that company in order to retire from business.

J. J. Scullan, connected with the Toronto plant of the Canadian Allis-Chalmers Co., has been appointed general superintendent of the company's shipbuilding plant at Bridgeburg, Ont.

E. A. Schluter has been named to take charge of the new branch office of the Machinery & Metals Sales Co., New York, which has been opened at 535 Oliver building, Pittsburgh.

Roy B. Wolley, who until a short time ago was advertising manager for the Standard Electric Stove Co., Toledo, O., and more recently was in the American ambulance field service in France, has returned to this country and taken a position in the advertising department of the Society for Electrical Development, New York.

Fred J. Miller has resigned his position as general manager of the factories of the Remington Typewriter Co., Ilion, N. Y. Mr. Miller was associated with the company for nine years.

Charles M. Welch, for some time Indianapolis manager for the Wagner Electric Mfg. Co., St. Louis, has been named to take charge of the company's recently opened sales office at 116 Auburn avenue, Atlanta, Ga.

August Jackson, for many years superintendent of the Minneapolis Steel & Machinery Co., Minneapolis, resigned recently to take a similar position with the Twin City Forge & Foundry Co., Stillwater, Minn.

James F. O'Keefe has been made general manager for Kieley & Mueller, Inc., New York, manufacturer of steam specialties. Mr. O'Keefe formerly was president of the Curran Mfg. Co.

S. H. Standish, who has been assistant superintendent at the plant of the Northwestern Malleable Iron Co., Milwaukee, has accepted the position of works manager for the Stowell Co., at South Milwaukee.

Francis M. Waring, who entered the mechanical department of the Pennsylvania railroad in 1900 and has served the company in various capacities since, lately has been named engineer of tests with offices at Altoona, Pa.

C. R. Murphy recently was named secretary of the Lawson Aircraft Corp., Green Bay, Wis. He succeeds C. I. Smith, who terminated his connection with the company a short time ago to engage in business of a different nature.

Cecil Ogden, who for the past 23 years has been associated with the Rivett Lathe & Grinder Co., Boston, in various capacities, resigned recently to become superintendent for the J. T. Slocomb Co., Providence, R. I.

M. Turton has been named mechanical superintendent of the International Railways of Central America. Mr. Turton will have offices at Guatemala City, Guatemala. He succeeds R. Potts, who resigned to take another position with the same company.

Zere Browne, formerly assistant general manager of the Allegheny Steel Co., Brackenridge, Pa., has been made general manager, succeeding the late W. Lester Walker. E. R. Perkins, formerly superintendent of the plate mill, has been made assistant general manager.

W. B. Sullivan has been named manager of sales for the Rich Tool Co., Chicago, twist drills and reamers, with headquarters at the general offices of the company in the Railway Exchange building. Mr. Sullivan formerly was eastern representative of the company with offices at Philadelphia.

J. D. Rohrman, district sales manager of the Allegheny Steel Co., with offices at 1113 Peoples Gas building, Chicago, has been granted a leave of absence for six months on account of ill health. During this period J. L. Harrison, now connected with the Brackenridge, Pa., office, will take the place of Mr. Rohrman.

Frank B. Archibald, who for the past five years has been associated with the National Lock Washer Co., Newark, N. J., as eastern sales manager, has been named vice president of that company. J. Howard Horn, eastern representative for the past seven years, has been named sales manager.

Wallace T. Roberts, formerly sales manager of the Sullivan Machinery Co., Chicago, in lower Michigan, northern Ohio and northern Indiana, has been appointed district manager at Denver. Mr. Roberts succeeds Capt. M. R. Blish, ordnance department, United States army, who has been acting manager at Denver since May. George W. Blackinson, manager at Denver until last May, is captain commanding the third battalion, 353rd regiment, Camp Funston, Kans. Joseph H. Brown, assistant manager of the New York office of the Sullivan company, has been appointed district manager at Chicago to succeeed William P. J. Dinsmoor, who has resigned to engage in business at Denver.

Iron and Steel Financial News

Up-to-the-Minute Fact and Comment Collected and Sifted For Busy Readers

Uncertainties Sway Financial World

UNCERTAINTY surrounds so many important factors in the financial situation that trading in stocks has been uncertain and hesitant, with a slight trend of prices toward lower levels. The military decision in Italy still hangs in the balance. The Bolsheviki remain in power at Petrograd. The Lansdowne peace talk injects another note, not welcome to the business community at this time, into the current war and peace discussions. The big allied war conference was in full swing at Paris last week. The important decision of the interstate commerce commission in the railroad rate advance case has been impending. Finally, and not least important, the opening of congress this week brings possibilities both of remedial and detrimental legislation, although this session has not before it so extensive a program as the last. The principal hope from this session is that congress will take steps to reassure the business community and remove financial misgiving by adopting a sane and systematic plan for dealing further with the tax schedules and public loans. It is felt most strongly that immediate steps be taken to revise the war revenue act, removing the existing ambiguities, inconsistencies and inequalities of the law.

Safeguarding Non-Essential Lines

The first steps just taken by the government to cut off coal from non-essential industries, through its powers of fuel administration and priorities direction, are attracting widespread interest . Suggestions that a list of non-essential industries be prepared, to which coal should be denied, have been turned down. Instead, a preferential list of companies to whom coal must be shipped has been established as less likely to injure the banking credit of concerns which it is considered certain will suffer. The wisdom of the policy is evident, for if the news suddenly were to be circulated broadcast that scores of specified companies would be compelled to curtail greatly or suspend entirely their operations for the duration of the war, credit might no longer be extended these concerns, loans might be called and the ensuing financial results might be very serious. Industries which find themselves outside of this preferential list cannot be urged too strongly to divert their efforts, if possible, as soon as they can, to lines which the government will deem necessary to the conduct of the war and the economic welfare of the public. By so doing they will not merely be serving selfish ends, but also will be performing a patriotic service, for they will be producing necessary goods and, what is just as important, they will cease to make non-essentials. When they stop making things for peace, the public, of course, will stop buying such things and, since employment will remain full, more money will be free for war loans.

Canonsburg Steel and Iron Passes to New Owners

The plant of the Canonsburg Steel & Iron Works, Canonsburg, Pa., has been sold to Cincinnati men, headed by E. W. Edwards. The 2019 shareholders are said to have received $330 per share, the par value being $100. The buyers will retain the company's name and will operate under the present charter. It is reported that the plant will be expanded. The company makes steel and iron sheets for stamping, enameling, deep drawing, tinning, galvanizing, etc., and has an annual capacity of 26,000 tons. The present capital stock is $250,000. The plant, the oldest one in Canonsburg, was erected in 1882 by the late Louis A. Meyran and other Pittsburgh citizens. Upon the death of Mr. Meyran in 1889, John F. Budke became active head of the company, retaining that position until his death five years ago. The company has been without a president since Mr. Budke's death. John W. Watson, George W. Retburg and George D. McNutt will continue in their respective positions of general manager, secretary and treasurer for the present.

Contest Management

The Laconia Car Co., Laconia, N. H., at its annual meeting in Boston, last week, elected the following directors: C. C. Barton Jr., Charles S. Clark, H. J. Coolidge, D. M. Hill, S. R. Hill, Henry Hornblower and H. N. Sweet. An opposition ticket proposed by H. Denton White, president of the company, was withdrawn at the last moment. The fact that a disagreement existed between the president and the board of directors was brought out at the meeting. When the directors organize a new president is likely to be elected. The new board comprises several Boston financial men who have put money into the company. The business was operated at a loss last year. The company has an order from the United States government for 450,000 shell forgings which will run from Dec. 15, 1917, to July 1, 1918, and an order for 250 cars for the Bangor & Aroostook railroad. Both these are labor contracts, the government and the railroad furnishing the raw material.

Brass Plants Merged

The Connecticut Brass Corp., West Cheshire, Conn., and the Pilling Brass Co., Waterbury, Conn., two interrelated industries, have been merged into one organization, to be known as the Connecticut Brass & Mfg. Corp., with $3,600,000 capital. The Connecticut Brass Corp. was formed last year by John E. Liggett of Liggett & Drezel, to take over an industry which had been in operation for 60 years. The Pilling Brass Co. was purchased by the new corporation. The West Cheshire plant makes heavy, coarse brass, while the Waterbury plant is the largest producer of thin rolled brass in the country. The two companies in the merger have a combined capacity of 2,500,000 pounds of

smelted metal and of 2,000,000 pounds of finished brass monthly.

Takes Over Foundry

The Wagner Castings Co., Decatur, Ill., has taken over the business and plant of the Decatur Foundry Co., of the same city, producer of light gray iron castings of high grade for small, intricate parts. The new company will continue this business and later will add malleables to its line. The Decatur Foundry Co. formerly was a malleable producer and a furnace and annealing ovens are part of the equipment. At one time it was known as the Central Malleable Co. and was owned by the Sattley interests of Springfield, Ill. General repairs are being made and a new core room and tumbling barrel room are being added. The main foundry is 70 x 320 feet. A. W. Wagner is head of the new company. He was organizer of the Decatur Malleable Iron Co. and holds his interest there and is a director.

Open Ore Mines

The high price of hematite ore of good quality in Canada has stimulated this branch of the mining industry. The Canadian Union Iron Mines Corp. recently incorporated with a capital of $1,000,000, has commenced to operate a hematite mine near Perth, Ont., from which several thousand tons of ore were taken some years ago. It will also open rich ore deposits near Sutton, Que., where rich hematite ore is said to have been uncovered.

Prepare to Build Plant

A new plant for the manufacture of concrete mixers, steel barn equipment and similar products will be erected at Milwaukee, early next spring, by the Standard Steel Corp., organized several months ago by E. J. DeGuenther and other local interests. The company has increased its capital stock from $50,000 to $300,000 in preparation for the work of erecting a plant. It has acquired a site of 23 acres adjoining the automobile parts plant of the A. O. Smith Corp., and proposes to build a brick and steel shop containing 250,000 square feet of floor space.

Sub-lets Contracts

The Four-Wheel Drive Auto Co., Clintonville, Wis., which is executing a government contract for 3750 class B military trucks, has sub-let contracts to the Mitchell Motors Co., Racine, Wis., and the Premier Automobile Co., Indianapolis. The companies, it is said, will build about 500 four-wheel drive trucks, starting delivery Jan. 1 at the rate of 150 a month. The Clintonville company also has booked an order for spare parts for the trucks reported to involve about $6,000,000. Work on a series of machine shop and power plant additions is being rushed. A 350-horsepower steam generating unit is being added at this time.

Drops Mold Making

Owing to the increased demand for Adamite rolls and castings, requiring the full capacity of its Midland, Pa., foundries, the Pittsburgh Iron & Steel Foundries Co. has discontinued the manufacture of ingot molds and has consequently sold its entire ingot mold equipment and patterns to the Marshall Foundry Co., Pittsburgh, Pa. Space of the Pittsburgh Iron & Steel Foundries Co.'s plant heretofore devoted to the production of ingot molds will now be available for making rolls and castings. The Marshall Foundry Co. will be put in a better position to serve its trade with ingot mold requirements.

Financial Crop Ends

The High Speed Tools Corp., Manhattan, has filed reorganization papers at Albany, N. Y., which gives its capitalization as $100,000.

* * *

Recent increases in capitalization include the following: The Russell Fraser Wire Co., Brooklyn, N. Y., from $60,000 to $80,000, and the Almarz Spain Tin Mines Corp., New York, from $500,000 to $700,000.

* * *

The B. F. Sturtevant Co., Hyde Park, Mass., has filed a statement with the commissioner of corporations, dated June 30, which shows cash and debts receivable of $1,955,166, a surplus of $638,802 and total assets and liabilities of $5,631,280.

* * *

The Metal Specialty Co., New Britain, Conn., has taken over the A. S. Ford Co., Bristol, Conn., and has removed the machinery to its plant, combining the business of the two companies. In the spring the plant will be enlarged.

* * *

The American Locomotive Co.'s plant at Manchester, N. H., which has been idle for several years, has been sold to the Amoskeag Mfg. Co. Agent H. F. Straw of the Amoskeag company, declined to say what his company intends to do with the newly acquired plant. It is well equipped with modern locomotive machinery.

* * *

The American Printing Co. has purchased all the property of the Fall River Iron Works Co., Fall River, Mass., the preliminary steps of a consolidation of the two in a new corporation of the same name. Each is now capitalized at $2,000,000. The Fall River Iron Works Co. was organized in 1821 as an iron works and since 1886 has been operated in making cotton goods.

* * *

Dodge Brothers, Detroit motor car manufacturers, have increased their capital stock from $6,000,000 to $10,000,000 to permit plant extensions. The company has large orders for war materials which it will manufacture in buildings apart from its main plant. The Dodge Brothers Realty Co. also has been incorporated by John F. Dodge, Horace E. Dodge and A. L. McMeans, with capital of $2,500,000 to control the properties of the company being given over to the manufacture of munitions.

Dedicate New Shipyard

Leading officials of the United States Steel Corp. and the Steel corporation's subsidiaries held a ceremony at the new shipyard of the Federal Shipbuilding Corp., near Newark, N. J., Nov. 2. On that occasion the first plate rolled by the new Liberty mill of the Carnegie Steel Co. was riveted into the hull of one of the 9400-ton vessels which the Federal company now is building for the Emergency Fleet corporation. Judge Gary, in an address to the workers, told of the record construction of the Liberty mill and of its significance in carrying out the country's shipbuilding program.

To Consolidate Papers

The International Trade Press, Inc., Chicago, announces the purchase of the Cement Era Publishing Co. of that city. A consolidation will be effected of the *Cement World*, the *Cement Era* and the *International Trade*, to be known as the *Engineering and Cement World*, which will be issued semi-monthly. The first consolidated number will appear Jan. 1. The officers of the International Trade Press, Inc., follow: Charles W. Price, chairman of the board of directors; C. A. Tupper, president-treasurer; Lyman A. Sisley, vice president and secretary, and Harry W. Walker, business manager.

To Make Ingots

Daniel J. Driscoll, formerly owner of the Diamond State Steel Co. plant at Wilmington, Del., which now is a property of the Midvale Steel & Ordnance Co. has established a plant at Hamburg, Pa., which is about to be placed in operation. The output of the latter will be steel ingots.

Tool Bargain With Canada Fails

Governor General Prohibits Exportation of Machine Tools Except Under License Thus Hindering Plan of American Munition Makers—International Arms & Fuse Corp. Closes for 500 Tools—Crane Demand is Unfilled

PLANS of some American munitions makers have received a setback from the policy recently adopted by the Canadian government forbidding the exportation of machine tools. This policy previously was set forth in THE IRON TRADE REVIEW. Since the United States began placing large shell contracts certain companies have sought to secure needed tools from Canadian munition plants which have become less active with the dimunition of British shell orders placed in the Dominion. Accordingly, negotiations for the equipment of certain of these plants were well under way, when the governor general ordered the prohibition of such exports except under special license from the minister of customs. As the United States government has placed some large shell contracts in Canada, it is apparently the policy of the Canadian government to encourage the use of Canadian machinery to turn out shells for our government in Canada.

International Arms Buys Heavily

The purchase of lathes and other shell-working machinery by the International Arms & Fuse Corp., Bloomfield, N. J., has been the feature of the machine tool market in the past week or so. The number of tools bought is placed at about 500, largely lathes. Included in the orders were 100 Gisholt turret lathes and a number of Warner & Swasey lathes. It is reported that the company has been negotiating for the entire shellmaking plant of the American Locomotive Co., which was offered for sale about six months ago and then withdrawn. The J. G. White Engineering Corp., 23 Exchange Place, New York, has been buying machines for domestic shipment. The Union Pacific railroad plans to enlarge its shops at Cheyenne, Wyo., at a cost of about $1,600,000. A syndicate is being formed to erect a $5,000,000 steel plant near Seattle. B. L. Thane, Seattle, is the leading spirit of the new organization. The Southern Shipbuilding Corp. has received a contract from the United States shipping board for 16 7500-ton steel cargo ships of the Whittelsey panel type. The ships will be fabricated in the Birmingham district and will be assembled at a yard in Charleston, S. C. Whittelsey & Whittelsey, navy architects, 17 Battery Place, New York, will buy equipment. The Lutz Co., Philadelphia, which has a contract for French equipment for ordnance being made in France for the use of United States troops has issued the following list of machine tools which are desired for December delivery: Ten 36 or 42-inch planers; three 12 or 18-inch slotters; one heavy-duty radial drill; one 18 or 22-inch tool room lathe; one 36-inch heavy-duty lathe, and eight 24 to 30-inch lathes.

Many Crane Lists Are Issued

The second list of electric traveling cranes recently issued by the Federal Shipbuilding Co., 54 Day street, New York, is comprised of the following items: Two 50-ton four-motor cranes with 10-ton auxiliary hoists; four 5-ton three motor cranes; one 15-ton three-motor crane; two 20-ton four-motor cranes; and two additional 10-ton cranes. The first list, which remains pending, includes two 35-ton, four 20-ton and four 10-ton cranes. Heyl & Patterson, Inc., Pittsburgh, have been awarded an order for a 60-ton traveling revolving portal crane with 5-ton auxiliary hoist for the Merchant Shipbuilding Co., Bristol, Pa. The Chester Shipbuilding Co., Chester, Pa., is in the market for a 15-ton fitting-out crane. The Worthington Pump & Machinery Corp. closed for the list of 39 cranes and hoists, which it recently issued, as follows: Three cranes to the Whiting Foundry & Equipment Co., Harvey, Ill.; eight cranes to the Erie Steel Construction Co., Erie, Pa.; and the remaining hoists to the Detroit Hoist & Machine Co., Detroit. The Northwestern Barbed Wire Co., Sterling, Ill., is in the market for a 1-ton, a 2-ton and a 3-ton monorail crane. The Bedford Foundry & Machine Co., Bedford, Ind., has been awarded a contract for six electric traveling cranes of 15 to 25 tons carrying capacity, for the William Cramp & Sons' Ship & Engine Building Co., Philadelphia. The Cramp company now is about to close a further order for four 7½-ton cranes for ammunition storage buildings and one 20-ton crane for its newly acquired La Vergne plant. Westinghouse, Church, Kerr & Co. have placed an order with the Erie Steel Construction Co. for one 10-ton and 15-ton electric cranes for the Hydraulic Pressed Steel Co., Cleveland. The Liberty Ordnance Co., Bridgeport, Conn., is in the market for a 15-ton locomotive crane.

Chicago Market on War Basis

WITH the Chicago machine tool market practically upon a war basis, manufacturers are finding it difficult to obtain equipment without priority certificates. Dealers advise that priority certificates be obtained before any attempt to buy equipment be made. Some tools that have been ordered for several months are being held up until priority certificates are obtained and in their absence the machines will be delivered to users who have government work. It is estimated that 90 per cent of business now on the books of local dealers is for tools to be used in government work. Priority certificates now are being used even in connection with second-hand machinery and instances have been known where desired tools have been commandeered and taken out of shops which were not engaged in producing materials for the government. A buyer for an eastern dealer was in this market recently, seeking 150 24-inch lathes for work on 6-inch to 9-inch shells, but he was unable to obtain more than a few such tools. The American Mfg. Co. is building a powerhouse and machine shop at East St. Louis. The Edwards Cylinder Co. will build a plant at Pekin, Ill. The C. Mattison Machine Co., Beloit, Wis., is building a plant at Rockford, Ill. The Buda Co. is building an assembling plant at Harvey, Ill. The United States Gear Shift Co., Eau Claire, Wis., will build a two-story plant. The Arneson Foundry Co., Kenosha, Wis., will build a foundry addition. The Detroit Nut Co. will build a 2-story

The Central Steel Co., Massillon, Ohio

Chicago Detroit Cleveland Philadelphia

AGATHON STEELS
TRADE MARK

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factory. The Union Pacific railroad is said to be in the market for a 15 and 25-ton traveling crane for its shop at Pocatello, Idaho. The Houston Car Wheel & Machine Co., Houston, Tex., will install equipment to double its capacity.

Fewer Tool Inquiries Are Current

INQUIRIES for machine tools in the Pittsburgh distict have shown a falling-off. Whether this is due to the fact that requirements of the government have been well taken care of, or it is recognized that makers are filled up and cannot take additional orders is a question. The demand for domestic consumption is extremely limited, owing to the inability of this class of buyers to obtain early deliveries and by reason of high prices. Once deliveries on government contracts are completed, it is expected that there will be an extremely heavy buying movement on the part of private consumers. The Verona Forging Co., Verona, Pa., during the past week bought two 10-ton cranes This company is engaged on government work.

Many Lists Still Pending

GOVERNMENT business predominating almost to the exclusion of everything else, features the Cleveland machine tool market. Inquiries are of fairly large proportions and are above the average weekly demand; but these inquiries are unusual in that they seem to come from various centers rather than from the state generally. Current orders for equipment have been accompanied with priority certificates of A-1 rating for the most part. Deliveries are lagging still farther. No price changes have been made for the past three weeks. The Recording & Computing Machine Co., Dayton, O., which a short time ago issued an inquiry for 44 milling machines, has closed for 26 of these machines. An order has been placed by the F. B. Stearns Co., Cleveland, for 27 milling machines, with the Motch & Merryweather Co., Cleveland. The Ford Motor Co. and Dodge Bros., both of Detroit, continue to buy in small lots in the Cleveland market wherever tools are available. Additional equipment soon will be required by the McMyler Interstate Co., Cleveland, it is reported. The Standard Parts Co., Cleveland, has made an inquiry for several automatic screw machines. The Schlieper Engineering Co., Pittsburgh, is in need of a number of single-purpose lathes. A 6-inch bar horizontal boring mill is required by Mackintosh, Hemphill & Co., Pittsburgh. The Buckeye Machine Co., Lima, O., requires an 8-inch bar horizontal boring machine. The Penn Mold & Mfg. Co., Dover, O., has issued an inquiry for an 18 or 24-inch lathe or planer. Prices on a shear and magnet are desired by the Savage Arms Corp., Sharon, Pa. The Industrial Works, Bay City, Mich., is in the market for a 10-ton traveling crane.

New Construction and Equipment

Concise and Timely Business Building Opportunities from the Field of Industry

Along the Middle Atlantic Seaboard

BUFFALO.—The Kellogg Products Co., 98 Delaware avenue, will build a transformer house addition, boiler house and packing house, to cost $40,000.

BUFFALO.—The Automatic Transportation Co., 2933 Main street, will build a machine shop to be 2-stories high and 55 x 150 feet in size.

BUFFALO.—The Lackawanna & Western railroad has let the contract for a 1-story power house to the Durolithic Construction Co., Ellicott square.

BUFFALO. — The Buffalo Union Furnace Co., Hambury street, will build a boiler and engine house addition, to cost $14,000.

BUFFALO.—J. P. Devine Co., 3172 Clinton street, has had plans drawn for an addition to its foundry, 1-story high and 26 x 200 feet in size, to cost $5000.

BROOKLYN, N. Y.—James Shewan & Sons Inc., foot of Twenty-seventh street, have drawn plans for a 1-story machine shop addition.

BROOKLYN, N. Y.—The Roberts Numbering Machine Co., 706 Jamaica avenue, has had plans drawn for a plant extension, to be 2½ stories and cost $30,000.

BROOKLYN, N. Y.—Anderson & Jackson, 722 Court street, will build a 1-story foundry, 52 x 78 feet in size, to cost $7000.

CORNING, N. Y.—The Corning Foundry has been incorporated with $100,000 capital. The incorporators are W. M. Gurnsey, S. E. Flitner and B. W. Wellington.

LOCKPORT, N. Y.—The Simonds Mfg. Co. will build a 1-story plant, 50 x 150 feet in size.

MT. VERNON, N. Y.—Otto P. Weisswange, Inc., has been chartered with $50,000 capital to manufacture precision thermometers and other scientific apparatus. The incorporators include M. Hertz, H. Weissman and E. K. Noll, 44 Court street, Brooklyn, N. Y.

NEW YORK.—The Militer Corp. has been chartered with $1,000,000 capital to manufacture airplanes, automobiles and ordnance. The incorporators are A. W. Britton, G. V. Reilly, 65 Cedar street, and others.

NEW YORK.—E. D. Giberson & Co. have been chartered with a capital of $50,000 to manufacture iron and steel products. The incorporators are E. D. and M. F. Giberson and R. D. Whiting, 370 Wadsworth avenue.

NEW YORK.—The Edison Electric Appliance Co. has been organized with a capital of $2,650,000. The incorporators are C. E. Patterson, H. C. Houck and A. H. Jackson, Schenectady, N. Y.

NEW YORK.—The Gas Engine & Power Co. and Charles A. Seabury & Co., Inc., plan to build a machine shop addition, to be 1-story high and 20 x 50 feet in size.

NEW YORK.—The Washburn Wire Co. has let the contract for rebuilding its plant recently damaged by fire to John H. Deeves & Bro., 103 Park avenue.

NEW YORK. — Firth & Marshall have been chartered with $100,000 capital to manufacture wireless and other electrical appliances. The incorporators include: J. Firth, C. Marshall and H. Freece, 35 Wall street.

NEW YORK.—The Price Engine Corp. has been organized with a capital of $1,000,000. The incorporators are J. M. Harding, G. F. Jebbett, and J. T. Crowley, 81 Morton street.

NEW YORK.—The Washburn Wire Co., 118th street and Harlem river, plans to rebuild part of its plant recently damaged by fire.

NORWICH, N. Y.—The Universal Aircraft Corp. plans factory additions.

PLATTSBURG, N. Y. — The Plattsburg Alloys Corp. has increased its capital from $6000 to $125,000 to provide for plant extensions.

ROCHESTER, N. Y.—The Crayier Foun-

GETTIN' IN LINE WITH THE BIG BOSS

The Big Boss is all smiles and him and Little Jimmy are eating out of the same spoon. It's all on account of an order filled by the Hubbard for MACHINE MOULDED GEARS which are "some pumpkins". The B. B. slapped me on the back and says: "Jim! You should be in New Orleans playing the ponies as your tips always bring home the bacon."

My 4-11-44 Special: ***Brothers***

Let the Hubbard handle your MACHINE MOULDED GEAR requirements and you will cash in all bets.

So long,

Rolling Mill Jim.

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings.

dry Co. has been chartered by J. T. Cravier, L. C. Graves and T. Hanlon Jr.

SYRACUSE, N. Y.—The Crucible Steel Co. of America will build two additions to its plant here. The J. D. Taylor Construction Co., South Selina street, is the contractor.

UTICA, N. Y.—The Bossert Corp., 1021 Hickory street, has had plans drawn for a tool house and a boiler house addition, 1-story, 40 x 70 feet, and 20 x 80 feet, respectively. The joint cost will be $8000.

WATERTOWN, N. Y.—The city will build a power plant to cost $300,000. The S. M. Greene Co., 293 Bridge street, Springfield, Mass., is architect and engineer.

BUTLER, PA.—Spang & Co. will build a plant addition, 1 and 2-story, 168 x 255 feet, to cost $150,000.

CORRY, PA.—The Standard Screw Co. will build a large addition to its plant. Contract has been awarded.

ERIE, PA.—The C. H. Williams Co., clam shell buckets, is in the market for a number of machine tools. J. J. Williams is purchasing agent.

ERIE, PA.—The Erie Forge & Steel Co. will take bids shortly on a steel plant to cost between $5,000,000 and $10,000,000. Day & Zimmerman, 611 Chestnut street, Philadelphia, are engineers.

ERIE, PA.—The Pennsylvania railroad will build iron ore docks on the water front. Farley Gannett, consulting engineer, is in charge.

FREELAND, PA.—The Freeland Machinery & Iron Co., recently incorporated with a capital of $50,000, has bought the old plant of the Salmon Iron Works, which it will convert into a modern plant. Tonhill Bros., Scranton, Pa., are interested.

HAMBURG, PA.—D. J. Driscoll, Reading, Pa., will build a foundry for making electric steel. Thomas Quinn, Lebanon, Pa., is consulting engineer.

HARRISBURG, PA. — The Pennsylvania Bronze Foundry Co., Seventh and Camp streets, will build a 1-story foundry, 35 x 100 feet.

JOHNSTOWN, PA. — The Davis Brake Beam Co. plans to erect an addition to its plant.

JOHNSTOWN, PA.—The Flood City Mfg. Co. has increased its capital from $15,000 to $100,000 to provide for plant extensions, including a 4-story steel and concrete factory to be erected at Messenger and Elder streets. J. E. Hershberger is general manager of the company.

NORRISTOWN, PA.—W. Lownes Browning, Wayne, Pa., has purchased the Lounge & Butler machine shop and will make extensions and alterations.

PHILADELPHIA.—The Tacony Steel Co. will build a 2-story laboratory, 22 x 37 feet in size.

PHILADELPHIA. — The Philadelphia & Reading railroad, Reading terminal, has taken bids on a 1-story machine shop.

PHILADELPHIA.—The Aluminum Brazing Co. of Pennsylvania has let the contract for 1-story mill, 35 x 60 feet, to cost $6000, to M. T. Ackerman, Morton, Pa.

PHILADELPHIA.—The Giseke Steel Collapsible Crate & Box Co. has been incorporated with $300,000 capital under a Delaware charter.

PHILADELPHIA.—Haines, Jones & Cadbury, manufacturers of plumbers' supplies, steam fittings, etc., will erect several additions to their plant at Twelfth and Spring Garden streets.

PHILADELPHIA.—The William Cramp & Sons Ship & Engine Building Co. have let the contract for two shops, 58 x 100 feet, and 120 x 120 feet in size, to cost $35,000, to the Joffman Engineering & Construction Co., Pennsylvania building.

PHILADELPHIA.—A contract has been awarded to F. Crompton & Bros., 4614 Oakland street, for a 1-story, 72 x 186-foot machine shop, to be built by the Hulton Dyeing Co. The cost will be $21,000.

PITTSBURGH.—The Hunter Saw & Machine Co., Fifty-seventh and Butler streets, will build a 1-story brick factory.

SCRANTON, PA. — The National Carbon Co., Cleveland, has secured a site and will build a plant on Washington avenue.

WILLIAMSPORT, PA.—The Calley Iron Works is drawing plans for a 1-story plant addition.

CAMDEN, N. J.—The New York Shipbuilding Corp. has let the contract for its machine shop addition to the McClintic-Marshall Construction Co., Pittsburgh.

CARTERET, N. J.—The Nelson Electrolytic Cell Co. has been incorporated with $250,000 capital. The company will manufacture electric cells and batteries. Hamilton M. Dawes and Otto J. Wagner, New York, are directors.

ELIZABETH, N. J.—The R. S. Christie Co. has been organized with $50,000 capital to manufacture anvils. The incorporators include R. S. Christie, C. Christie and J. S. Ramsay.

ELIZABETH, N. J.—The W. A. Clark Wire Co. has drawn plans for a 2-story plant addition, 105 x 177 feet in size, to cost $100,000.

GARWOOD, N. J.—The Aircraft Specialties Co. has been organized with a capital of $25,000 to manufacture motors. The incorporators are William B. Elliott, William Siebenmorgan and George A. Elliott.

HARRISON, N. J.—W. Ames & Co., manufacturers of bolts, will build a 1-story plant addition to cost $6000.

IRVINGTON, N. J.—The Irvington Mfg. Co., Coit street, has had plans prepared for a 1-story plant addition to cost about $8000.

LINDEN, N. J.—The Standard Aero Corp. has awarded the contract for a 2-story factory and office building to cost $250,000.

NEWARK, N. J.—The Art Metal Works, steel lockers, etc., 7 Mulberry street, has let the contract, for 3-story plant addition, 90 x 120 x 130 feet, to Henry M. Duremus, 36 Orange street.

NEWARK, N. J. — The A. W. Wheaton Brass Works, Railroad avenue, has let the contract for a 1-story plant addition to cost $5000.

NEWARK, N. J.—J. Regner, 68 Gotthart street, has had plans prepared for a 1-story welding shop.

NEWARK, N. J.—The American Can Co. has let the contract for its three plant additions to the Turner Construction Co., 242 Madison avenue, New York.

NEWARK, N. J.—The Newark Wire Works, 51 Bruen street, has let the contract for a 1-story shop, 30 x 80 feet, to cost $4000.

NEWARK, N. J. — The Robinson-Roders Co., 35 New Jersey Railroad avenue, will build a 4-story brick factory, 29 x 75 feet in size, to cost $9000.

NEWARK, N. J.—The C. F. Massey Co. will erect a 1-story frame and concrete factory, 24 x 80 feet, and a 1-story frame factory, 40 x 150 feet, on the Passaic river, to cost $15,000.

NEW ROCHELLE, N. J. — The Alloy Foundry & Machine Co. has been chartered with $10,000 capital. The incorporators are G. C. Pansegrau, A. C. Wakeling and W. E. Wollheim, 2467 Valentine avenue.

REDBANK, N. J.—The Roberts Safety Watertube Boiler Co. has had plans drawn for a 2-story plant addition, 80 x 142 feet in size.

SOUTH RIVER, N. J.—The factory of the Para Products Co. has been damaged by fire.

DOVER, DEL. — The Fouguey American Steel Concrete Shipbuilding Co. has been organized with $4,000,000 capital. The incorporators are C. L. Rimlinger, M. M. Clancy and Clement M. Egner, Wilmington, Del.

DOVER, DEL.—The Standard Shipbuilding & Dry Dock Co. has been incorporated with $20,000,000 capital. The incorporators are C. L. Rimlinger, M. M. Clancy and C. M. Egner, Wilmington, Del.

DOVER, DEL.—The Way Cleanse Corp. has been chartered with a capital of $5,000,000. The company will manufacture machines for cleaning streets and car tracks. The incorporators include Samuel B. Howard, Arthur W. Britten and George V. Reilly, New York.

DOVER, DEL.—The T. A. Gillespie Loading Corp. has been chartered with $2,000,000 capital to conduct a machine shop business. The incorporators are L. B. Phillips and J. B. Bailey.

WILMINGTON, DEL.—The Pan American Manganese Corp. has been chartered with a capital of $3,500,000 with the following incorporators: C. L. Rimlinger, M. M. Clancy and Clement M. Egner.

WILMINGTON, DEL. — The Pensacola Shipbuilding Co. has been organized with $2,250,000 capital by C. L. Rimlinger, M. M. Clancy and C. M. Egner.

DOVER, DEL. — The National Reduction Corp. has been chartered to manufacture charcoal, tar, turpentine, etc. The company is capitalized at $1,100,000 and the incorporators include James H. Kirkpatrick, Guy V. Ferguson and Parke L. Woodward, Great Kills, Staten Island, N. Y.

WILMINGTON, DEL.—The Electro Products Corp. has been organized with $500,000 capital to manufacture machinery. The incorporators are M. L. Rogers, L. A. Irwin and Harry W. Davis.

WILMINGTON, DEL.—The Motorless Sign Flasher Co. has been incorporated with $300,000 capital to manufacture storage batteries and other electrical equipment. The incorporators are A. M. Halloran, S. A. Williams and Ferris Giles.

BALTIMORE. — The Bartlett-Hayward Co. has awarded the contract for the erection of a 1-story 160 x 380-foot plant at Gunpowder and Hamburg streets. The cost will be about $80,000.

NORFOLK, VA.—Bids are being received at the bureau of supplies and accounts, navy department, Washington, for furnishing the navy yard at Norfolk with brass, manganese bronze and copper; brass, copper and lead pipe; cast iron and steel pipe, terra cotta pipe, brass pipe and tubing, solder, brass, copper and steel tubing.

WYTHEVILLE, VA.—R. P. Johnson will equip a saw and planing mill and is in the market for used equipment, including two small locomotives, log trucks, planer, floor machine, molder, resaw, rip-saw, swing cut-off, lumber trucks, boilers, engines, etc.

Remember "Farrell-Cheek"

When You Need *Castings Quick!*

JUST TRY US

Here's what one customer says:

"Our relations last year were very satisfactory, and we wish to thank you for the way in which you took care of our needs. We have never been held up for steel castings, because you have always been able to increase your production to meet any increase that we required."

It's easy enough for a foundry to make you *promises* on delivery. And it's easy enough for that same foundry to manufacture alibi after alibi "explaining" why your order has been delayed.

But that doesn't help you any, does it?

We don't make excuses. We get your castings out just when we promise them. And we do this at a sacrifice to ourselves too, for in anticipation of emergencies *we hold 30% of our entire capacity open*—which enables us to back up our promises to the letter.

Nor do we sacrifice *quality;* for "Farrell-Cheek" quality is thoroughly guaranteed to be second to none.

Write us when you need

SMALL STEEL CASTINGS

for

Tractor Work, Machine Tool Work, Truck Work, etc., *and*

Blank Gears, and Carbonizing and Case Hardening Boxes

Farrell-Cheek Steel Foundry Co.

SANDUSKY, OHIO

BRANCH OFFICES

NEW YORK PHILADELPHIA CHICAGO

Among New England Factories

MECHANIC FALLS, ME.—Fire in the Colonial mill of the Poland Paper Co. caused $40,000 damage to machinery.

BOSTON. — The United States Machine Gun Co. has been incorporated with $500,000 capital. Harold D. Appolonio and George D. Haskell, Concord, Mass., are the incorporators.

CAMBRIDGE, MASS. — The Blake & Knowles Works of the Worthington Pump & Machinery Co. has let the contract for a foundry extension to the Aberthaw Construction Co., Boston.

FALL RIVER, MASS. — The Fall River Iron Works Co. has let the contract for a brick and reinforced concrete, 1-story, 40 x 100-foot factory building on Ferry street.

LOWELL, MASS.—The International Machine Co. has been incorporated with $36,000 capital by Wheaton Kittredge, Ira Harris and A. E. Erikson.

NEWPORT, R. I.—The navy department has awarded the contract for a power plant to cost $900,000 to Westinghouse Church Kerr & Co., 37 Wall street, New York.

NEWPORT, R. I.—The government will build a brick, steel and reinforced concrete, storehouse to cost $80,000 at the naval training station.

PROVIDENCE, R. I.—The Atlantic Mining Co. has been incorporated with $325,000 capital by John W. Coggeshall, Cranston, R. I., Edward M. Johnson, East Providence, R. I., and others.

PROVIDENCE, R. I.—The Rhode Island Tool Co., 148 West River street, will build an annealing room, 1-story high and 45 x 140 feet in size, to cost $16,000.

PROVIDENCE, R. I.—The General Mfg. & Exporting Co. has been incorporated with $10,000 capital by Raymond P. McCanna, Francis I. McCanna and Thomas J. McGauley.

WARREN, R. I.—The Warren Mfg. Co. will build a brick, fireproof, 3-story, 100 x 180-foot addition to cost $75,000 at North Main street and Pleasant place.

HARTFORD, CONN.—The Colt's Patent Fire Arms Mfg. Co. has awarded the contract for its factory and storage building to the James H. Grozier Co., 721 Main street.

NORWICH, CONN.—The Safety Ventilating Lock Co. has been incorporated to make hardware with $200,000 capital. David D. Wellman, Frank A. Wellman and Samuel G. Wellman are the incorporators.

PUTNAM, CONN. — The O. Heineman Phone Supply Co., 45 West Forty-fifth street, New York, has awarded the contract for a branch factory.

TORRINGTON, CONN.—The Union Hardware Co. has awarded the contract for a 1-story plant addition 100 x 180 feet in size.

WATERBURY, CONN. — The Mattatuck Mfg. Co. will build a 4-story plant, 60 x 200 feet in size. The Aberthaw Construction Co., 27 School street, Boston, is the contractor.

WATERBURY, CONN. — The American Brass Co. will build a 1-story plant addition, 42 x 51 feet, to cost $4000.

WINDSOR LOCKS, CONN.—E. Horton & Son Co. will build a 2-story plant addition, 40 x 52 feet in size to house boring mills and lathes.

Activities in the Central States

APPLETON, WIS. — The Appleton Hay Tool Co. contemplates the erection of plant additions to include a malleable iron foundry.

APPLETON, WIS.—The Eagle Mfg. Co., which recently increased its capital stock from $200,000 to $500,000 to provide for developing its tractor department, has awarded a contract to Gruenke Bros., for the erection of a 1-story machine shop addition, 120 x 120 feet in size. Work is already under way.

APPLETON, WIS.—Lawrence college, Dr. Samuel Plantz, president, is in the market for two boilers for its central heating and power plant.

CLINTONVILLE, WIS. — The common council has accepted the bid of Hahn & Resnow for the construction of a steel and concrete bridge across the Wolf river at a cost of $11,000.

CLINTONVILLE, WIS.—A public utility corporation is being organized to build an artificial gas plant and distributing system.

DE PERE, WIS.—The C. A. Lawton Co. will start work at once on the erection of a new pattern shop to replace the building badly damaged by fire. Practically all machinery and equipment must be replaced. The loss is estimated at $15,000.

KIEL, WIS.—Bids are being taken by the Kiel Woodenware Co., through Charles A. Cahill, consulting engineer, 1426 First National Bank building, Milwaukee, for a generator set and motors for its power plant, under construction.

MADISON, WIS.—M. W. Torkelson, chief engineer, state highway commission, is preparing plans for a new steel and concrete bridge to be built over the Wisconsin river between Juneau and Adams counties. The cost is estimated at $60,000.

MADISON, WIS. — The Cruiser Motor Car Co. has broken ground for its new automobile manufacturing plant, the first unit of which will consist of a 1 and 2-story machine and assembling shop, 63 x 275 feet in size. Fritz Bros. are the contractors.

MILWAUKEE.—The Liberty Foundry Co. recently incorporated with a capital stock of $30,000, has awarded the general contract for the erection of a foundry and machine shop, 60 x 125 feet, to J. D. Morrison, 625 Sixty-ninth avenue, West Allis, Wis.

MILWAUKEE.—A charter has been granted to Sommers & Sons Co., capitalized at $100,000 to manufacture metal specialties. The incorporators are Frank Pergande, Hamilton Hazlehurst and John F. Woodmouse.

MILWAUKEE.—The Northwestern Bridge & Iron Co. has taken the general contract for the construction of two brick, steel and concrete shop buildings for the Milwaukee Forge & Machine Co., 220-224 Lake street, which will establish a new plant at Oklahoma and Montana avenues. The forge shop will be 1 story high and 75 x 135 feet in size; the machine shop will be 1 story high and 64 x 120 feet in size. The work will cost $60,000 and calls for about 175 tons of structural steel.

DETROIT.—The American Machine Products Co. has been organized with $10,000 capital. The incorporators include E. A. Munger, J. C. Cook, W. H. Wetherbee and others.

DETROIT.—The Automatic Screw Machine Co. has been chartered with $25,000 capital. The incorporators include Joseph H. Mailhot, E. L. Olney, B. I. Mailhot and others.

DETROIT.—The Detroit-Edison Co. is issuing $9,000,000 in bonds to provide for improvements in equipment. The Conners Creek power house will be enlarged and the power plant at Monroe, Mich., will also be overhauled.

DETROIT.—The Rouse Folding Crate Co. has been incorporated with capital of $100,000 to manufacture sheet metal crates and baskets. L. A. Paisley is president and treasurer.

DETROIT.—The Aluminum Castings Co. has let the general contract for the erection of a heat treating plant and pattern shop to Ernst Bros.

DETROIT. — The Air-O-Flex Automobile Corp. plans to build a factory for the production of motor trucks. The plans call for 300,000 square feet of floor space.

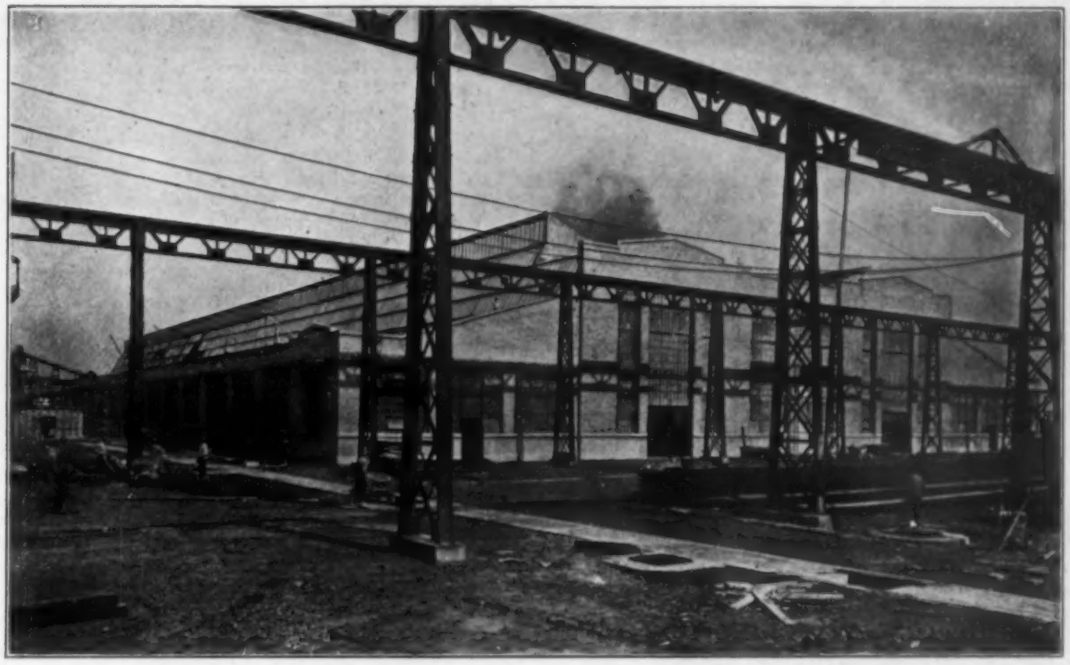
GRAND RAPIDS, MICH.—The Tannewitz Works is tearing down its old frame factory and will erect a modern building. The company has recently purchased a site adjoining its present plant.

GRAND RAPIDS, MICH.—The Wolverine Brass Works, 620 Monroe avenue, is in the market for new machinery and equipment.

GREENVILLE, MICH. — The Michigan Marl Co. will rebuild its plant severely damaged by fire last week. The new buildings will be of concrete.

OWOSSO, MICH.—The Independent Stove Co. has let the contract for erection of 4-story plant addition to be 60 x 100 feet in size.

CHICAGO.—The H. G. Seal Co., 4410 Ravenswood avenue, will build a 2-story, 120



THE NEW FORGE SHOP of The Pullman Company, Pullman, Illinois, the second step in a reconstruction plan evolved from a comprehensive analytical survey made by The Arnold Company. The building shown was designed and constructed by

THE ARNOLD COMPANY

ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL

CHICAGO: 105 South La Salle Street NEW YORK: 111 Broadway

Say you saw it in THE IRON TRADE REVIEW

x 125-foot factory to cost $100,000. W. T. Branitska, 54 West Randolph street, is architect.

CHICAGO.—The Harrington & King Perforating Co., 612 North Union avenue, is having plans prepared for a 1 and 2-story factory to be built on Taylor and Campbell avenues. The cost will be $150,000.

EAST ST. LOUIS, ILL.—The St. Louis Coke & Chemical Co., W. G. McGuire, secretary, St. Louis, contemplates building a large by-product coke plant.

EAST ST. LOUIS, ILL.—The Durbin Automatic Train Connector Co., recently organized, is receiving bids on the erection of a 1-story foundry. V. S. Durbin, Pontiac building, St. Louis, Mo., is president.

HARVEY, ILL. — The American Stove Works has awarded the contract for a 2-story plant addition to cost $10,000. J. M. Clark is in charge.

PEORIA, ILL.—The Safety Signal Corp. has been chartered with $200,000 capital to manufacture automobile accessories. B. F. Hardesty, Jefferson building, is in charge.

QUINCY, ILL.—The Gardner Governor Co., South Front street, is in the market for a boring machine. J. W. Gardner is president.

THAYER, ILL. — Damage amounting to $15,000 resulted from a fire in the machine shop of the Chicago, Wilmington and Springfield mine.

TERRE HAUTE, IND.—The Lower Vein Coal Co. has been damaged by fire with a loss of $50,000 to its tipple and boiler rooms. F. W. Richards is in charge.

AKRON, O.—The Jahant Foundry & Heating Co. has been organized with a capital of $100,000. The incorporators include H. F. McGill, Philip B. Treash, A. H. Comming and others.

ASHLAND, O.—Samuel L. Grundstein has purchased a site on which he will erect a 3-story brick building and install lifting magnets and metal shears to handle scrap.

CINCINNATI.—The Chemical Products Co. has been chartered with $20,000 capital. The incorporators are Owen N. Kinney, David S. Oliver, Leander D. Oliver, George S. Baily and others.

CINCINNATI. — The Cincinnati Terminal Warehouse Co. will erect a 7-story terminal and warehouse building 175 x 750 feet in size on Front street. The cost will be about $2,200,000. A. M. Allen & Co., Cleveland, are engineers.

CLEVELAND.—The Vichek Tool Co. has been chartered with $900,000 capital, with the following incorporators: F. J. Vichek, E. A. Meckes, W. J. Hunkin, Cuyahoga building, George S. Gynn and Charles Higley.

CLEVELAND.—The city is receiving bids on 1000 tons of structural steel for an addition to the municipal light plant, to cost $700,000.

CLEVELAND. — The contract has been awarded to Westinghouse Church Kerr & Co., 37 Wall street, New York, for the new building of the Hydraulic Pressed Steel Co., at East Sixty-first street and Hydraulic avenue.

COLUMBUS, O.—The Johnson-Miller Engineering Co. has been chartered with $30,000 capital to manufacture dies. The incorporators are Thomas H. Johnson, E. J. Miller, F. D. Wright and others.

DAYTON, O.—The Buckeye Iron & Brass Works, 326 East Third street, has increased its capital from $75,000 to $200,000 to provide for plant extensions.

DEFIANCE, O. — The Defiance Machine Works has secured a site on which it will build a foundry.

EAST LIVERPOOL, O. — Harry Reeves, Beaver Falls, Pa., has purchased 100 acres as a site for a proposed industrial plant.

MARION, O.—The Marion Die Tool & Machine Co. has purchased a site on the Pennsylvania railroad and will erect several new buildings. E. W. Owen is general manager.

SANDUSKY, O.—The American Crane Co. has an option on a 50-acre site on which it proposes to build a new plant. The company has a large government contract for the production of picric acid.

YOUNGSTOWN, O.—The Republic Iron & Steel Co. has purchased 381 acres. Plans for the development of the property have not been made public.

YOUNGSTOWN, O. — The Savage Arms Co., Sharpsville street, is building a machine shop. The company plans extensions involving an investment of $1,000,000.

GLASGOW JUNCTION, KY. — Paul J. Mahoney is in the market for a 25-horsepower boiler and for a well-drilling rig.

LOUISVILLE, KY. — The Reciprocating Electric Tool Co., incorporated with a capital stock of $100,000 to manufacture drills and riveting machines, will erect a factory. J. J. Roberts, 412 Courier-Journal building, is in charge.

LOUISVILLE, KY.—The Roy C. Whayne Supply Co. is in the market for two double-driven haulage engines and for two air compressors.

LOUISVILLE, KY.—The Continental Car Co. of America is in the market for an electric hoist.

SOMERSET, KY.—The Southern Machinery Exchange is in the market for a 5-horsepower electric motor.

New Business in Eastern Canada

VANCOUVER, B. C.—The Canadian Metals Ltd. will equip a scrap yard and is in the market for shears, oxy-acetylene cutting equipment, lifting magnet, etc.

BIG BEND FALLS, ONT.—Plans are under consideration for the development of electric power for the supply of the Gowganda and Matachewan districts.

BRANTFORD, ONT. — The city council will purchase a 40-horsepower motor for its pumping station.

BRANTFORD, ONT. — The foundry of Charles Lake, 46 West street, has been damaged by fire with a loss of $50,000.

BROCKVILLE, ONT. — The blacksmith shop and fitters plants of the Grand Trunk railway have been damaged by fire and considerable machinery must be replaced. The loss is estimated at $50,000. The plants will be rebuilt.

CHATHAM, ONT.—The T. H. Taylor Co. is in the market for a complete outfit of Jones under feed stokers, and for two boiler installations, including engines and fans, etc.

CREIGHTON MINES, ONT.—The Canadian Copper Co., Copper Cliff, Ont., is having plans prepared for the erection of a 1-story brick machine shop to cost $10,000. J. G. Agnew is manager.

DUNDAS, ONT. — Contracts have been awarded by Pratt & Whitney, Dundas street, manufacturers of machinery, tools, etc., for the erection of a factory and office building to cost $200,000.

GALT, ONT. — The Canadian Machinery Corp. will build a brick and steel addition to its plant on Water street south, to cost about $60,000.

HAMILTON, ONT.—The Robert H. Hassler Co., Indianapolis, manufacturer of shock absorbers, has leased a building on Sherman avenue, and will establish a plant. J. C. Piper will be manager.

HAMILTON, ONT.—The Steel Co. of Canada has commenced the erection of a by-product coke plant which will have a capacity of between 300,000 and 400,000 tons per year and cost $1,000,000.

LINDSAY, ONT.—The Grand Trunk railway, will build a machine shop to cost $40,000.

PARIS, ONT.—The plant of the Alabastine Co., William street, has been damaged by fire with a loss of $15,000. The plant will be rebuilt and new machinery and equipment will be installed.

PARIS, ONT.—Fire at the McFarlane Engineering Works has caused a loss of $5000 and damaged a quantity of machinery.

PORT ARTHUR, ONT.—The Saskatchewan Co-operative Elevator Co. will construct a new elevator at the north end water front at a cost of $450,000.

PORT ARTHUR, ONT. — The Canadian Northern railway elevator B will be rebuilt during the winter at a cost of $500,000.

PORT ARTHUR, ONT. — The Terminal Land Co., Fort William, Ont., has purchased the property of the Conley Frog & Switch Co., the plant of which was under construction before the war, but was never completed. It will be equipped and operated as a factory.

RENFREW, ONT.—The Renfrew Refrigerator Co. has been incorporated to manufacture refrigerators and carry on a machine shop and foundry business with $100,000 capital stock. Robert Handley, Alexander Blue and Samuel Moffatt, are the incorporators.

SARNIA, ONT.—The Mueller Mfg. Co. has purchased a site of 45 acres on Lapeer avenue and will erect a plant to cost $400,000.

SARNIA, ONT.—The Holmes Foundry Co. will build a plant to cost $75,000. Work will be commenced at once.

STRATHROY, ONT. — The St. Andrew Wire Works Co., Orillia, Ont., has secured a building which it will equip for the manufacture of wire products. G. M. Haldane is manager.

ST. MARYS, ONT.—W. W. Porter, De-

Interior of an Austin Standard No. 3 Building, 600 feet by 900 feet. Erected complete in 55 calendar days.

In Stock, Ready for 30-Day Completion

AT Bridgeport, Conn., Cleveland, Indianapolis, Massillon, O., Philadelphia, and Pittsburgh, we have in stock subject to prior sale structural steel trusses, columns, purlins, etc., fabricated and ready for immediate shipment to completely erect—

1,300 Linear feet Austin Standard No. 1, 60 ft. wide.
1,200 Linear feet Austin Standard No. 2, 90 ft. wide.
360 Linear feet Austin Standard No. 3, 100 ft. wide.

¶ Steel sash and roofing materials for these buildings are in stock, under contract and in transit.

¶ We can erect any of these three Austin Standard Buildings on your property in 30 working-days from date of order. Quality, cost, and time of completion, are guaranteed.

Write, phone or wire the office nearest the proposed work

THE AUSTIN COMPANY

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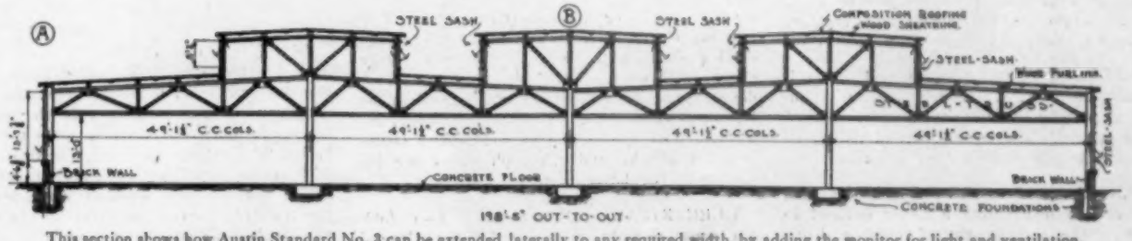
CLEVELAND	16210 Euclid Avenue	Eddy 4500
DETROIT	Penobscot Building	Cherry 3894
INDIANAPOLIS	Merchants' Bank Building	Main 6428
NEW YORK	217 Broadway	Barclay 7755
PITTSBURGH	House Building	Court 1193
PHILADELPHIA	Bulletin Building	Spruce 1291; Race 4017
WASHINGTON	Bellevue Hotel	Main 2550



This section shows how Austin Standard No. 3 can be extended laterally to any required width, by adding the monitor for light and ventilation. It can be built in any dimensions that are multiples of 20 feet in length and 50 feet in width. From the point *A* to point *B*, leaving out the monitor under *B*, is the well-known cross-section of this No. 3 Standard.

troit, contemplates the erection of a factory to manufacture farm tractors.

TORONTO, ONT.—The Queen City Foundry Co., which has been taken over by the Bond Foundry & Machine Co., Manheim, Pa., will be operated as the Bond Engineering Works, Ltd. The company will make a number of additions to the plant and will install equipment for the manufacture of power transmission machinery as well as gray iron castings. H. M. Lee has been appointed manager.

TORONTO, ONT. — The Polson Iron Works, foot of Frederick street, will build a galvanized iron and frame pattern shop to cost $10,000.

TORONTO, ONT. — W. H. Banfield & Sons, 372 Pape avenue, are having plans prepared by Sproatt & Rolph, 36 North street, for the erection of a foundry building to cost $5000.

TORONTO, ONT.—The plant of the St. Clair Foundry Co., on the Esplanade, has been damaged by fire with a loss of $10,000.

TORONTO, ONT.—Ker-Carb, has been incorporated to manufacture automobiles, engines and all kinds of machinery and implements with $20,000 capital stock. James H. Spence, L. M. Heal and E. Staples, are the incorporators.

TORONTO, ONT. — The Dominion Shipbuilding Co. has been incorporated with $1,000,000 capital stock. The directors are Joseph M. Bullen, Harold L. Steele, James H. Fraser and others.

TORONTO, ONT.—The Canadian Northern railway, E. Langham, general purchasing agent, is in the market for two lathes.

TORONTO, ONT.—The Cluff Ammunition Co., whose plant on Atlantic avenue was recently damaged by fire, plans to rebuild its plant and will require new machinery.

TORONTO, ONT.—The Alloy Steel Works, Ltd., will take over the steel plant on Front street East, formerly operated by the Moffatt-Irving Steel Co. The new company, which will make electric steel castings, plans to build plant additions and to install another electric furnace. John Russell and H. T. Armstrong, Toronto, Ont., are interested.

WHITBY, ONT. — The United Rubber Mfg. & Reclaiming Co. will erect a $15,000 factory and install $25,000 worth of machinery.

LACHINE, QUE.—The Dominion Bridge Co., Montreal, Que., will build a forging plant for the manufacture of marine forgings.

MONTREAL, QUE.—The Montreal Locomotive Works, Dominion Express building, will build an addition to its machine shop to cost $23,000.

AMHERST, N. S.—The International Engineering Co. will build an addition to its foundry on Laplante street, to cost $5000.

MAHONE BAY, N. S.—The shipyard of McLean Bros. has been leased by Montague Mahaffy, and is being extended so that three ships can be built at the same time. A new mill is being erected and air compressors will be installed.

NORDIN, N. B.—The International Shipbuilding Corp., New Castle, N. B., has commenced the erection of a wooden shipbuilding plant on the Miramichi river, to cost about $100,000.

ST. ANTHONY, N. B.—The forge plant of Philip Melanson has been damaged by fire with a loss to building and equipment of $30,000.

ST. GEORGE, N. B.—J. A. Gregory, St. John, N. B., will build shipyards to cost $100,000.

Foundry Construction

The Skinner & Eddy Corp., Seattle, will build a foundry, 60 x 150 feet.

The Novo Engine Co., Lansing, Mich., will build a foundry and machine shop.

The Westinghouse Electric & Mfg. Co., East Pittsburgh, will build a $50,000 foundry.

Wickes Bros., Saginaw, Mich., contemplates the addition of a foundry to their plant.

A contract has been let for the erection of a 70 x 85-foot addition to the plant of the Fairmount Foundry Co., Woonsocket, R. I.

The Liberty Foundries Co., Rockford, Ill., has increased its capital stock from $5000 to $25,000.

The Boston Stove Foundry Co., Boston, has been incorporated by Louis Cohen, Joseph Lanes and Isaac Bachrach with $50,000 capital.

The United States Malleable Iron Co., Toledo, O., has increased its capital stock from $250,000 to $350,000.

Walloch Foote and Oscar Berg have organized the Advance Brass Mfg. Co., Muskegon, Mich., and will make brass castings.

The Ben Sibbett Iron & Foundry Co., Wichita, Kans., has been incorporated with a capital stock of $30,000.

A contract has been awarded by the Interstate Foundry Co., Cleveland, for the erection of a $20,000 addition.

The Cooley Mfg. Co., Seattle, Wash., contemplates building a brass foundry and other additions to its plant.

The Barton Tannery Co., 310 Hunter street, Newark, N. J., will build a steel foundry, 39 x 100 feet, at a cost of $20,000.

The Otto Biefeld Co., Watertown, Wis., will build a foundry and machine shop addition at a cost of approximately $35,000.

The Moreland Motor Truck Co., 1701 North Main street, Los Angeles, is erecting an electric steel foundry, 60 x 120 feet.

S. A. Michler, San Francisco, will erect a two-story foundry and machine shop at a cost of $10,000.

The Sydney Foundry & Machine Co., Sydney, N. S., will build a foundry at Halifax, N. S., at a cost of $7500.

A contract has been awarded by the Essex Foundry Co., Newark, N. J., for the erection of an addition.

The A. W. Wheaton Brass Works, Newark, N. J., will build a brick, 33 x 50-foot brass foundry at a cost of $4000.

The General Electric Co., Everett, Mass., has let the contract for a 42 x 210-foot addition to its foundry.

The Barlow Foundry Co., Newark, N. J., will erect a foundry of brick and steel construction. The estimated cost is $20,000.

The American Radiator Co., Buffalo, will build a 120 x 200-foot foundry at a cost of $150,000.

A contract has been awarded for the erection of a new plant for the Van Wert Foundry Co., Van Wert, O.

The Atlas Steel Casting Co., 1963 Elmwood avenue, Buffalo, will erect an addition, 40 x 96 feet, at a cost of $4000.

The Waterloo Gasoline Engine Co., Waterloo, Ia., will build a 120 x 525-foot foundry, of brick and concrete construction.

The Master Carburetor Co., Los Angeles, has been incorporated with $200,000 capital, by D. F. Poyer, E. M. Chandler and Charles G. Harness.

New Trade Publications

GREASE CUPS.—The William Powell Co., Cincinnati, has published a 20-page bulletin devoted to a diversified line of grease cups. Over 20 kinds are presented and separate specification tables are given with each type.

MILLING CUTTERS.—The Cleveland Milling Machine Co., Cleveland, recently published a bulletin devoted to a stock list of milling cutters. The cutters are all illustrated and complete specifications are presented.

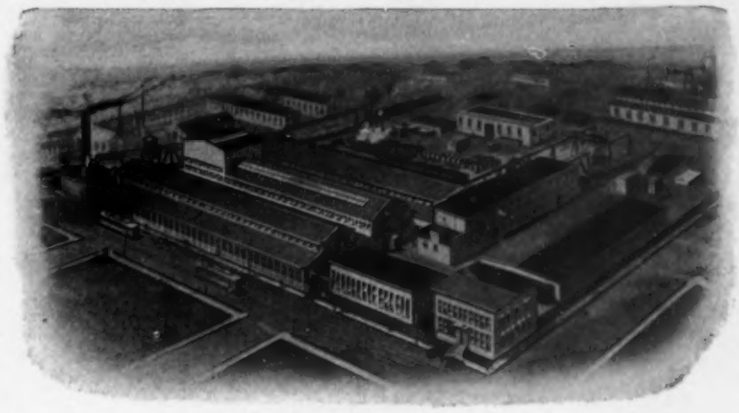
GRAB BUCKETS. — The Blaw-Knox Co., Pittsburgh, is distributing a folder devoted to buckets. The arrangement of holding drum, counterweight, blocks and sheaves for adapting an ordinary stiff leg derrick originally equipped for only one load line, to operate a two-line clamshell bucket is also described. The bulletin reproduces several photographs of Blaw buckets in action.

CHUCKS.—The Skinner Chuck Co., New Britain, Conn., recently published a 72-page catalog devoted to lathes, drills and planer chucks and vises. The booklet, which is indexed, presents descriptions and specifications for all sizes of these products. Additional information on special chucks and repairs necessary on chucks and telegraph codes are included in the latter part.

ELECTRICAL EQUIPMENT.—Two folders were recently sent out by the General Electric Co., Schenectady, N. Y., containing an index to recent publications of the Publisher's bureau of the company. One index of sixteen pages is devoted to an alphabetical list of publications describing supply parts of electrical equipment. The other, appearing in a 12-page bulletin, lists the publications describing various articles of equipment.

FRICTION CLUTCHES. — A booklet issued by the Carlyle Johnson Machine Co., Manchester, Conn., illustrates a number of applications of the friction clutches made by that company. The clutches are employed in horizontal milling machines, vertical boring mills, screw machines, drill presses, etc. The clutch has but few working parts and these are inclosed to keep out dirt. In addition to the single type of clutch described, the company also manufactures a double type which is particularly applicable to countershafts.

OIL TANKS.—The Walter A. Zelnicker Supply Co., St. Louis, recently published a



The MILWAUKEE CRANE

A crane embodying the elements of safety, substantial design and excellent construction; an organization composed of executives and engineers who have grown up with the crane business; a plant equipped with modern machine tools. PROMPT DELIVERY! All of this at your service.

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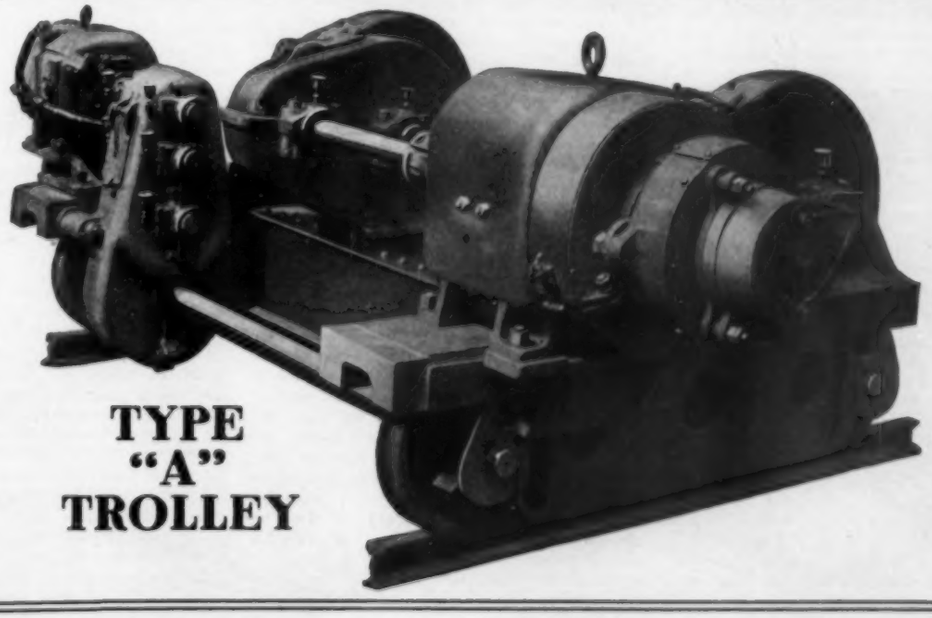

TYPE "A" TROLLEY

bulletin devoted to oil tanks. The company announces that it recently purchased all the tankage from three abandoned oil storage farms. These tanks range in capacity from 14,500 barrels to 38,500 barrels. Other dimensions including height, diameter, etc., are also presented. A portion of the bulletin is devoted to a number of 2500-ton capacity tanks which are available for shipment at the present time.

SAWS.—A 24-page bulletin devoted to saws has been published by the Pittsburgh Saw & Mfg. Co., Pittsburgh. The first types described are metal-slitting saws which are thin milling cutters ground on the sides and left a little thicker at the outer edge than near the center in order to give proper clearance in cutting deep slots. They are made of chrome, semihigh and high-speed steel. Descriptions of milling saws, tube saws, pipe cutters, friction discs and high-speed saws are also included in the bulletin. Complete specifications are presented.

SPEED MOTORS.—The General Electric Co., Schenectady, N. Y., is distributing a booklet devoted to adjustable speed motors. It is claimed in the booklet that two advantages especially feature these motors. The first of these is that commutation troubles arising from abuse or careless operation are practically eliminated. The second is that the main field coils are so designed that they will stand without injury, full potential with the armature at rest. Included in the booklet is an alphabetical arrangement of various parts.

REVERSE GEARS.—The Carlyle-Johnson Machine Co., Manchester, Conn., has issued an illustrated circular describing its alloy steel reverse gear and friction clutch. The gear consists of a nest of spur gears incorporated in a gear cage on each end of which clutch members are mounted. The gears are always in mesh with the shaft pinions. Expanding friction rings are mounted on each end of the gear cage and are manipulated by toggle levers. The leverage is so compounded that it requires but little pressure to operate the clutches. Double-row ball bearings support the main drive shaft at each end of the gear cage.

PULLEYS.—"Getting Maximum Pulley Efficiency," is the title of a 38-page bulletin being distributed at the present time by the American Pulley Co., Philadelphia. Maximum efficiency in a belt pulley, the booklet starts out, means the transmission of power with the least cost. The first cost of the pulley, cost of upkeep, fuel, maintenance, belt, life of the pulley and the elements of safety and general dependability are all factors to be considered in arriving at the efficiency of the pulley. After its introduction, the bulletin enumerates a number of qualifications which make for maximum efficiency. Other sections of the booklet are devoted to descriptions of mechanical construction of pulleys and methods of installation.

ALUMNITE.—A folder has been published by the Alumnite Mfg. Co., Inc., New York, describing a modified welding process. The process follows: Thoroughly clean the edges of the metal which are to be soldered together, with gasoline and then wash vigorously. To tin the surfaces apply the brush vigorously and raise the temperature of the metal with a blow-torch until the solder melts freely upon the edges to be joined. While still applying the torch continuously brush the solder into the joint until the latter shows a perfect planing or thin coating of the solder. To unite the work lay it upon a metal plate and place between it and the plate a piece of asbestos about ½-inch thick. Bring the joint together and on it melt some of the solder. Continuously apply the torch and work the solder into the crack until the latter is filled up.

COLD ROLLING.—The Yoder Co., Cleveland, manufacturer of cold rolling machines, recently published an interesting 28-page bulletin devoted to a diversified line of these products. These machines produce molding, tubes, channels, and other light gage products. A considerable portion of the booklet is given over to one particular size of cold rolling machine which takes a flat tread at the feeding roll at the head of the machine and gradually develops it through a series of forming rolls and delivers the completed product at the opposite end. The machine can be run either directly connected or through an overhead pulley and friction clutch system. It is claimed that material as heavy as 11 gage can be successfully operated on. Beading, forming, shearing, and other machines are also described and illustrated in the booklet.

TURRET SCREW MACHINES.—Two turret screw machines are described and illustrated in pamphlets recently issued by the Southworth Machine Co., Portland, Me. The smaller machine has a hexagonal turret with six one-inch holes for holding shank tools. Facilities also are provided for bolting tools to the face. A backward movement of the slide automatically revolves the turret. The turret is hand operated by a turnstile and the travel is automatically governed by an independent adjustable stop for each turret. Taper gibs and an adjusting frame give vertical and lateral adjustments of the turret. The cut-off slide is operated by a lever and fitted with adjustable stops to regulate the forward and backward movement. The larger machine is essentially the same in design, except that a geared friction head is used giving six spindle speeds, three with open belt and three with back gears.

AIR COMPRESSORS.—The Nagle-Corliss Engine Works, Erie, Pa., recently published a 12-page booklet devoted to direct-connected, electrically-driven air compressors. In this compressor the frame is massive and rigid and is supported on its foundation for its entire length. Openings, fitted with oil-tight covers, are provided for a section of the crosshead and pin. Crank shields over the crank are said to prevent the throwing of oil or the seepage of oil vapor. In the main bearings the jaws are ribbed and reinforced. The flood system of lubrication is employed. The quarter boxes, with large bearing surfaces rest on planed surfaces in the bearing jaws and are held down by a large cap. The air pistons are of box form, in one piece. The piston rods are open hearth steel forgings machined and polished. The crosshead is of semi-steel fitted on top and bottom with adjustable screws and can be removed when necessary by a jack bolt arrangement.

CUTTING TOOLS.—An unusually attractive bulletin 32-pages in length, describing cutting and threading tools, has been published by the Borden Co., Warren, O. The principles of the die stock manufactured by this company is said to be as follows. In the recessed slot cut at an angle in one of two upwardly extending lugs in the die stock rests an extension of the cam plate holding the dies. As the die screws on the pipe, the angular slot turns the cam plate slowly allowing the dies to open at the rate of pipe taper. An advantage of these dies is said to be the fact that by a simple turn of a handle, the dies can be set to thread all sizes of pipe, thus avoiding the time lost in changing dies. Individual descriptions are included in the bulletin, with each product illustrated. For convenience on the part of consumers, the company has presented the numbers of all parts of tools. Photographs of installations are also reproduced.

GRAVITY CONVEYORS. — An attractive folder is being distributed by the Lamson Co., Boston, describing and illustrating gravity conveyors, and demonstrating how they can be used as a substitute for man power. Once in position, these conveying systems are said to operate without charge or expense. They will do the necessary carrying from one floor to another, from room to room, from machine to machine, from assembling room to shipping room, and from the shipping room to the wagons or cars. They will go around corners and through rooms. Their motive force consists of lively steel rollers and automobile bearings. The conveyor proper consists of spirals and steel breakers and comes in straight or curved lengths and in stationary or portable sections. All conveyors have switches for conducting loads to any department or station. The folder reproduces photographs of a number of Lamson conveying systems in operation and shows a diversified line of enterprise to which they may be applied.

ALUMINUM BRONZE.—Two bulletins devoted respectively to "Titanium Aluminum Bronze" and "Die Cast Titanium Aluminum Bronze" are being distributed by the Titanium Bronze Co., Inc., Niagara Falls, N. Y. The first bulletin is 12 pages in length and devotes considerable space to the physical properties of this alloy, reproducing microphotographs to enable the reader to secure a better idea of the metal structure. Aluminum bronze is said to be particularly adaptable to spur, spiral and worm gears, feed nuts, bolts, pump valves, plunger rings, pump rods, acid fittings and parts. The last two pages of the booklet are devoted to endurance records, alloy formulas, etc. The second bulletin, devoted to the die cast alloy, shows the improvements which have been effected in the art of die casting aluminum bronze within the last few years. One particular example shows how a die casting manufactured several years ago required nine distinct machining operations. At the present time, the booklet states, only two machining operations—tapping and drilling—are required on one of these castings.

PRESSURE RECORDERS. — The Bacharach Industrial Instrument Co., Pittsburgh, is distributing an interesting bulletin devoted to pressure recorders for measuring pressure and velocity measurements. They are built as indicating, recording and combined indicating and recording instruments. It is said that minute pressure changes are indicated and that readings of differences in pressure and draft of as low as 0.001 of an inch water gage are possible. This is said to be due to the magnification of the readings and the sensitiveness of the instrument. The apparatus consists of a cylindrical vessel or tank properly filled with water. The pressures to be measured are transmitted to the instrument and act upon the float. The float is bell-shaped and its interior communicates with the gas main, the flue, or the stack in which the pressure or draft is to be measured. The latter is transmitted to the space below the bell whereas the space above the bell communicates with the atmosphere. The position of the bell is determined by the difference in pressure within and without the bell, the magnitude of its movement depending upon the design of the float proper and the bell. The recording mechanism rests on the top of the tank and consists of a drum for holding the chart and a specially designed clock. The clock rotates the drum once every 24 hours, so that a complete record of a day's operation is furnished. The charts are 4 inches, 6 inches and 8 inches high.

20-Ton Rolling Type Open Hearth Furnace, Built for the Halcomb Steel Co., Syracuse.

Open Hearth Furnaces

The Wellman-Seaver-Morgan Open Hearth Furnaces are made in such variety of style, size and shape as to supply any of your requirements. **Made by men who know,** they give complete satisfaction.

The rolling type illustrated above is found to be most satisfactory when used as an auxiliary to the electric furnace. The metal is heated and brought to a semi-finished state, then transferred to an electric furnace for finishing off.

The body can be tipped at the exact moment when the metal is of the desired composition and, as no injury is done to the pouring hole by opening and closing, the life of the furnace bottom is correspondingly prolonged.

Get in touch with us when in the market, and learn more about* W-S-M *equipment.

Remember, we are in a position to accept additional tonnage for **Heavy Steel Castings for prompt shipment.**

Principal Products of The W-S-M Company

Steel Plant Equipment:
Manipulators, Furnaces, Charging Machines, etc.
By-Product Coke Oven Machinery.
Shipyard Cranes.
Hoisting and Mining Machinery.
Ore and Coal Handling Machinery.
Special Large Cranes.
Gas Producers, Gas Valves.
Hydraulic Turbines.
Johnson Hydraulic Valves.
Steel Castings.

WELLMAN SEAVER MORGAN COMPANY
CLEVELAND
OHIO U.S.A.

Iron and Steel Prices

Corrected to Tuesday Noon

IRON ORE

Superior Ores, Per Ton, Lower Lake Ports.

Old range Bessemer, 55 iron	$5.95
Mesabi Bessemer, 55 iron	5.70
Old range non-Bess., 51½ iron	5.20
Mesabi non-Bess., 51½ iron	5.05

Port Henry Ores, non-Bessemer, Per Unit, Delivered Eastern Pennsylvania.

Old Bed, crude 55 iron	10.50c to 11.00c
Old Bed., concent., 65 iron	11.00c to 11.50c
Harmony, concent., 63 iron	11.50c to 11.75c
Lump (at mines)	$5.75c

WAREHOUSE PRICES

Steel bars, Chicago	4.10c
Steel bars, Cleveland	4.035c
Steel bars, Detroit	4.085c
Steel bars, Philadelphia	4.10c
Steel bars, New York	4.095c
Steel bars, St. Louis	4.17c
Steel bars, Cincinnati	4.08c
Steel bars, St. Paul	4.22c
Steel bars, Buffalo	4.05c
Iron bars, Buffalo	4.65c
Iron bars, Chicago	4.10c
Iron bars, Cleveland	3.985c
Iron bars, Detroit	4.75c
Iron bars, St. Louis	4.17c
Iron bars, Cincinnati	4.08c
Iron bars, Philadelphia	4.50c
Iron bars, New York	4.659c
Shapes, Chicago	4.20c
Shapes, Detroit	4.185c
Shapes, St. Louis	4.27c
Shapes, St. Paul	4.32c
Shapes, New York	4.195c
Shapes, Cleveland	4.135c
Shapes, Philadelphia	4.20c
Shapes, Buffalo	4.15c
Shapes, Cincinnati	4.18c
Plates, Buffalo	4.40c
Plates, Chicago	4.45c
Plates, Detroit	4.435c
Plates, St. Louis	4.52c
Plates, St. Paul	4.57c
Plates, New York	4.445c
Plates, Cleveland	4.385c
Plates, Philadelphia	4.45c
Plates, Cincinnati	4.43c
No. 10 blue anl. sheets, Chi.	5.45c
No. 10 blue anl. sheets, Cleve.	5.00c
No. 10 blue anl., Buffalo	5.40c
No. 10 blue anl., shets, St. L.	5.52c
No. 10 blue anl. sheets, Cinci.	5.43c
No. 10 blue anl. sheets, St. Paul	5.57c
No. 10 blue anl. sh., Detroit	5.435c
No. 28 black sheets, Chgo.	6.45c
No. 28 black sheets, Cleve.	6.35c
No. 28 black sheets, Cinci.	5.45c
No. 28 black, Detroit	6.435c
No. 28 black sheets, St. L.	6.52c
No. 28 black sheets, St. Paul	6.57c
No. 28 galv. sheets, Chgo.	7.70c
No. 28 galv. sheets, Cleve.	7.60c
No. 28 galv. sheets, Cinci.	6.65c
No. 28 galvanized, Detroit	7.685c
No. 28 galv. sheets, St. L.	7.77c
Hoops, Cleveland	8.00c
Hoops, Detroit	6.50c

IRON AND STEEL SCRAP

STEEL WORKS USE

(Gross Tons)

Bundled sheets, Pittsburgh	$22.00 to 23.00
Bundled sheets, Cleveland	21.25 to 22.00
Bundled sheets, Buffalo	19.00 to 20.00
City wrought, short, N. Y.	24.00
Frogs, switches, guards, St. L.	29.00 to 29.50
Heavy melting steel, Pitts.	30.00
Heavy melting steel, Buffalo	30.00
Heavy melting steel, Chgo.	28.50 to 29.50
Heavy melt'g steel, Cleveland	28.50 to 29.50
Heavy melting steel, Cinci.	25.00 to 25.50
Heavy melting steel, east. Pa.	27.00 to 29.00
Heavy melting steel, N. Y.	25.00 to 25.50
Heavy melting steel, St. L.	29.00 to 29.50
Heavy melting steel, Birming.	22.50 to 25.00
Hydraulic press. sheets, Cleve.	24.50 to 25.00
Hydraulic press. sheets, Pitts.	24.00 to 25.00
Hydraulic press. sheets, Chgo.	24.00 to 25.00
Low phos. steel, Buffalo	40.00 to 42.00
Low phos. steel, Pittsburgh	38.00 to 40.00
Low phos. steel, eastern Pa.	35.00 to 37.00
Shoveling steel, Chicago	27.50 to 28.00
Shoveling steel, St. Louis	27.00 to 27.50
Steel rails, short, Chicago	34.00 to 34.50
Steel rails, short, Cleveland	31.00 to 31.50
Steel rails, short, St. Louis	36.50 to 37.00
Steel rails, old, Birmingham	26.00 to 28.00
Stove plate, Cincinnati	16.00 to 16.50
Stove plate, St. Louis	16.50 to 17.00
Stove plate, N. J. points	19.50 to 20.00
Stove plate, Birmingham	17.50 to 18.00
Stove plate, Buffalo	21.00 to 22.00
Stove plate, eastern Pa.	22.00 to 23.00
Stove plate, Cleveland	19.00 to 20.00
Stove plate, Pittsburgh	20.00 to 21.00
Cast iron borings	11.00 to 12.00

(Net Tons)

Boiler plate, cut, No. 1, Chgo.	$19.00 to 20.00
Boiler plate, cut, No. 1, St. L.	18.50 to 19.00
Bundled sheets, Cincinnati	17.00 to 17.50
Knuckles, coup., Chicago	32.50 to 33.50
Knuckles, coup., St. Louis	30.50 to 31.00
Springs, Chicago	38.50 to 39.00
Stove plate, Chicago	18.25 to 19.25

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:

Cleveland	$0.95
Newark, N. J.	3.50
Boston	3.70
Philadelphia	3.30
Pittsburgh	.95
St. Louis	3.18
Minneapolis, St. Paul	4.54

Buffalo to:

Albany, N. Y.	$1.26
New England (rail)	3.10
New York and Brooklyn (rail)	3.10

Virginia furnaces to:

Philadelphia	$3.27
New England	3.77
Brooklyn, Jersey City, Newark	3.32

Birmingham, Ala., to:

Boston	6.00
Cincinnati	2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
Minneapolis, St. Paul	5.85
New York (r. and w.)	6.00
Philadelphia (r. and w.)	5.25
Pittsburgh	4.90
Savannah, Ga.	2.75
St. Louis	3.40

Chicago to:

Des Moines	$2.80
Milwaukee	.50
Minneapolis, St. Paul	2.00
Moline, Ill.	1.15
Omaha	3.58
St. Louis	1.58

Ironton and Jackson, O., to:

Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58
Minneapolis, St. Paul	4.54

Duluth, Minn., to:

Minneapolis-St. Paul	$1.25

Mayville, Wis.:

Minneapolis-St. Paul	$1.75

Freight Rates, Finished Material

Pittsburgh, carloads, per 100 lbs., to:

New York	19.5 cents
Philadelphia	18.5 cents
Boston	21.5 cents
Buffalo	16.0 cents
Baltimore	18.0 cents
Cleveland	13.5 cents
Cincinnati	17.0 cents
Chicago	21.5 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	79.0 cents
St. Louis	27 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	75 cents
Pacific coast (tin plate)	75 cents

IRON MILL USE

(Gross Tons)

Busheling, No. 1, Cleveland	25.75 to 26.75
Busheling, No. 1, Buffalo	26.00 to 27.00
Busheling, No. 2, Buffalo	17.00 to 18.00
Busheling, No. 1, Pittsburgh	21.00 to 22.00
Cast borings, New York	17.50 to 18.00
Cast borings, eastern Pa.	19.00 to 20.00
Cast borings, Cleveland	18.00 to 18.50
Cast borings, Buffalo	19.00 to 20.00
Cast borings, Pittsburgh	20.00
Cast borings, Birmingham	13.00 to 15.00
City wrought, long, N. Y.	30.00 to 31.00
Forge flashings, small, Cleve.	23.50 to 24.00
Forge flashings, large, Cleve.	22.00 to 23.00
Forge No. 1, Eastern Pa.	22.50 to 23.50
Grate bars, Buffalo	20.00 to 21.00
Grate bars, Cleveland	19.25 to 20.50
Grate bars, N. J. points	19.50 to 20.00
Iron axles, Pittsburgh	42.00 to 44.00
Iron axles, Cincinnati	42.00 to 42.50
Iron axles, Cleveland	49.50 to 50.00
Iron axles, eastern Pa.	50.00 to 55.00
Iron axles, Chicago	36.00 to 37.00
Iron rails, Chicago	36.00 to 37.00
Iron rails, Buffalo	37.00 to 38.00
Iron rails, Cincinnati	32.50 to 33.00
Iron rails, St. Louis	35.50 to 36.00
Iron rails, Cleveland	40.00 to 40.50
Machine turnings, Cleve.	18.00 to 18.50
Machine turnings, Buffalo	18.00 to 18.50
Machine turnings, N. Y.	16.00 to 17.00
Machine turnings, Pitts.	20.00
Machine turnings, east. Pa.	18.50 to 19.50
Machine turnings, Birming.	17.00 to 18.00
Pipes and flues, Cleveland	23.75 to 24.75
R. R. mch. cast, No. 1, Buff.	30.00 to 31.00
R. R. wrgt. No. 1, Buffalo	35.00
R. R. wrgt., No. 1, east, Pa.	35.00
Railroad wrgt., No. 1, Cleve.	33.50 to 34.50
R. R. wrought, No. 1, Pitts.	35.00
R. R. wrgt. No. 1, Birming.	26.00 to 28.00
Wrought pipe, Buffalo	26.00 to 27.00
Wrought pipe, eastern Pa.	30.00 to 32.00
Wrought pipe, New York	29.00 to 29.50

(Net Tons)

Angle bars, iron, Chicago	$37.00 to 37.50
Angle bars, steel, St. Louis	25.00 to 26.00
Arch bars & transoms, St. L.	42.00 to 42.50
Arch bars & transoms, Chgo.	37.50 to 38.50
Busheling, No. 1, Chicago	24.50 to 25.50
Busheling, No. 1, Cincinnati	21.00 to 21.50
Busheling, No. 1, St. Louis	22.50 to 23.00
Busheling, No. 2, Chicago	17.00 to 17.50
Cast borings, Cincinnati	13.00 to 13.50
Cast borings, St. Louis	16.50 to 17.00
Cast borings, Chicago	17.00 to 17.50
Cut forge, Chicago	29.00 to 29.50
Iron axles, St. Louis	44.00 to 44.50
Iron axles, Chicago	45.50 to 46.50
Machine turnings, Chgo.	16.75 to 17.25
Machine turnings, Cinci.	13.00 to 13.50
Machine turnings, St. L.	16.75 to 17.25
Pipes and flues, Chicago	22.00 to 23.00
Pipes and flues, St. Louis	21.50 to 22.00
Railroad wrgt., No. 1, Chgo.	31.00 to 32.00
Railroad wrgt., No. 1, Cinci.	28.50 to 29.00
Railroad wrgt., No. 1, St. L.	31.00 to 31.50
Railroad wrgt., No. 2, Chgo.	29.00 to 29.50
Railroad wrgt., No. 2, St. L.	29.00 to 29.50

IRON OR STEEL WORKS USE

(Gross Tons)

Axle turnings, Cleveland	$22.00 to 23.00
Axle turnings, Buffalo	26.00 to 27.00
Shafting, New York	34.00
Shafting, eastern Pa.	38.00 to 40.00
Steel car axles, Birmingham	32.00 to 33.00
Steel car axles, New York	46.00
Steel car axles, Buffalo	45.00
Steel car axles, Cleveland	46.00 to 47.00
Steel car axles, Pittsburgh	40.00 to 42.00
Steel car axles, eastern Pa.	50.00 to 55.00

(Net Tons)

Shafting, St. Louis	30.50 to 31.00
Steel car axles, St. Louis	42.50 to 43.00
Steel car axles, Chicago	41.00 to 42.00

IRON FOUNDRY USE

(Gross Tons)

Car wheels, (iron), Pitts.	30.00 to 31.00
Car wheels, (steel), Pitts.	33.00 to 35.00
Car wheels, eastern Pa.	33.00 to 35.00
Car wheels, Buffalo	32.00 to 33.00
Car wheels, Chicago	29.00 to 30.00
Car wheels, St. Louis	27.50 to 28.00
Car wheels, Birmingham	25.00 to 30.00
Car wheels, Cleveland	26.00 to 26.50
Tram car wheels, Birming.	20.00 to 25.00
Cast, No. 1, Birmingham	22.50 to 25.00
Cast, 1, machy., N. J. points	32.00 to 33.00
Cast No. 1, Cleveland	24.75 to 25.50
Cast, 1, heavy, N. J. points	30.00
Cast, No. 1, eastern Pa.	31.00 to 33.00
Cast, No. 1, Pittsburgh	28.00 to 29.00
Malleable railroad, Cincinnati	20.50 to 21.00
Malleable railroad, Cleveland	27.00 to 27.50
Malleable railroad, Buffalo	29.00 to 30.00
Malleable railroad, Pittsburgh	28.00 to 29.00
Malleable railroad, east. Pa.	30.00 to 32.00

(Net Tons)

Cast, No. 1, Chicago	24.00 to 24.50
Cast, No. 1, Cincinnati	24.50 to 25.00
Cast, No. 1, St. Louis	21.50 to 22.00
Malleable railroad, Chicago	27.50 to 28.00
Malleable railroad, St. Louis	25.00 to 26.00
Malleable agricultural, Chgo.	23.50 to 24.50

MISCELLANEOUS USES

(Gross Tons)

Reroll. rails, 5 ft. & ov., Pitts.	$34.00 to 36.00
Reroll. rails, 5 ft. & ov., Chgo.	35.50 to 36.50
Reroll. rails, 5 ft. & ov., E. Pa.	37.00 to 40.00
Reroll. rails, 5 ft. & ov., St. L.	35.50 to 36.00
Reroll. rails, 5 ft. or ov., Cleve.	37.00 to 38.00
Rerolling rails, long, Birming.	37.50 to 38.50

(Net Tons)

Boiler punchings, Chicago	31.50 to 32.00
Locomotive tires, Chicago	35.00 to 36.00
Locomotive tires, St. Louis	32.50 to 33.00